

They helped others like myself by paying for the tuition for the courses in the evenings. You still went to work all the time, but you did your work on your own. But if they paid the tuition, then that was good help.

Q: Now that kind of thing is critical to the development of your people--to have training courses and that outside base of expertise. It also provided you with consultants, didn't it?

A: Oh yes. One of the key cornerstones of HEC, when it was founded, was the training aspect of it because, just like you were talking, there were limited resources available then and we wanted to be sure that people were trained and trained fairly consistently. If you have everybody trained in different offices, they've got a little different outlook on how the profession should be conducted or performed.

Another problem that used to give us real headaches was when some discipline within an organization would do hydrology and hydraulic studies without coordinating with the actual Hydrology and Hydraulics Branch. For example, a lot of times we would run into people doing relocation work. The people doing relocation work would think they had to do all the studies in-house.

They would do the geotech work, the hydrology and hydraulics, the structures, everything that they needed to do they'd try to do in-house in their own little branch. They wouldn't go out and get the assistance they should have. Sometimes they would be using antiquated things that were no longer in use. When all they had to do is walk down the hall and get all the help they needed. They just didn't seem to want to do that.

I was always concerned about the people that would do that. Planners doing their own hydrology. That bothered me, too. I wanted--at least when I got to be in a position where I had a little bit of control over what went on--to be sure that whenever there were any hydrology studies done, at least they would be coordinated with the main hydrology and hydraulics group.

I don't know that that was always done. But some of the people--well, like I mentioned before, a person trained in hydrology would transfer over to the planning division. He'd figure he knew as much or more about hydrology than the guy in the Hydrology Department, so he'd do his own hydrology. But things might have changed since he was in the hydrology business, so he may be a little obsolete in what he was doing and he wouldn't know it, if he started to do it on his own. I guess that's true in other disciplines. You see the same kind of thing happening.

Q: You're sort of fighting human nature in that area, I'd say.

A: Oh yes, you really are because a person [who] has some training in the area, he feels like he knows as much about it as the other person or he thinks he does, why should he go to him for help. He says, "I can do this myself. " Well, not only that, I don't have to wait for it. If I call up the head of hydrology and ask him to do this study for me, he'll tell me, "Well, we'll put you in line. You'll get your study done three months from now," or something like that, and he wants it right now. So he says, "Well, I'll do it myself then."

Q: Get it done with?

A: Well, that happens a lot.

Q: When the H&H Branches or Sections were pretty fully developed in all the districts and divisions, about how many people did you have? Were you monitoring their professional development program in the career program?

A: Well, off hand it's a tough--there were so many--we had some surveys but I can't remember the numbers right off hand. Well, some of the offices had a pretty good staff and some of them a real small staff. But we had, how many district offices did we have?

Q: You had about 40 or so districts out there at that time.

A: About 40 districts. Well, just a rough guess of people in hydrology, there would have to be at least 200 of them or more. But from small offices, some offices only had a couple of people because they didn't do much. Others had big staffs and especially down in the southwest for awhile when they were building all those dams.

Then when you consider all the other people that work in hydraulic design and hydraulics and water control management and all that, numbers get a lot bigger than that. But just pure and simple hydrology, probably as a minimum, 200. That would be just a rough guess because I don't remember the numbers--we had to do that once in a while but the figures don't stick in my mind.

Computers

Q: Okay, that's fair. You were in from **1958** to 1985. You went in there about the **time** that computers were coming into engineering work in good quantities. How much did those computers change your work in H&H at OCE and throughout the Corps in those years?

A: Well, to tell you the truth, it didn't really change the work much in OCE. Where it did change the work was out in the production area out in the districts where they were doing a lot of studies. Then HEC was probably the most prominent organization in the Corps for developing computer capability when it first came along. They had converted hydrology and hydraulics computations to computer use quite a bit before some of the other disciplines got their stuff converted over. Now they didn't do so **much** new development in hydrology and hydraulics. I mean, like new theories or things like that, but they took all the existing capabilities and converted it over to computer use.

We used to have a lot of discussions about how they should develop that--the use of the computer. Some of the district offices were almost as prolific as HEC was in coming out with computer programs. Take, for example, Rock Island District, a fellow named Nanda from the Rock Island District--I can't even remember his first name. Maybe that's his first name. He is an Indian. He was really competent in hydrology and in computer programming. He liked developing small computer programs that he could hook together. HEC got more and more into big programs that worked so you could do a batch load. Well, back in those days, in the early days, they did everything in batch load. You **had** to load this thing up on a big computer and then wait in line to get your stuff. Nowadays, they have PCs [personal computers], of course, and you don't have to worry about waiting in line, you can just go ahead and do your studies.

But you would write up your program and your input data and put it on cards and give them to whoever was running the big computer. So you really didn't get to run the computer yourself, you just gave them the cards and they ran the computer. Except in places like HEC, where they got access to some of the big computers, and they rented space on some of the Lawrence Laboratory [computers], I think, and some of the other big places where they got the use of some really sophisticated computers.

I used to argue with HEC about putting together large package programs where you would provide all the input data in one run. The data would go in one end and out the other end would come all this information and results on what you needed to know about the project in order to design it without anything in between. You didn't get any outputs in between.

Now the programs were designed so that you probably could get access to intermediate stages of the computation, but that's not really the way it was set up to run. You just put it in there, and you got the answers out--that's what the planning people liked because they didn't want to fool around with the intermediate stages. My argument, of course, was, "Hey, how do you know something didn't go wrong in there." You may not even be able to tell in your answer whether it's reasonably right or wrong if you haven't checked all these different steps as you go along the way.

So the argument I use to get from Beard and Jay Frederick and some of the others that were in the early end of that computer business was, "Hey, you can do all kinds of 'what if' things with computers that you couldn't do before. " So, if you really wonder if a person can get better trained with a computer than they could by doing it by hand, they can try out different things. If this doesn't work, try something else.

But I still had reservations about that. I felt that too many people, because they could stick in data and get an answer, they didn't have to know anything about the theoretical background of where all this came about. What is a unit hydrograph, what does it do? How do you route floods through reservoirs and stuff like that? What are the procedures in backwater studies? What are the formulas and so forth that go into the concepts that.

They get wrong answers, and they don't know it. All they know is that they got the program to run, and they got an answer and they go ahead and apply it and also it kind of avoided checking. They would just assume the computer is right. Where years ago when they first started, when I first started, everything had to be checked. You never send anything ahead without [checking]--if you had a computation sheet, it always had to be computed by and checked by someone. You just never sent anything without checking.

Well, that kind of went by the wayside when the computers come along. You probably still need that sort of thing though. I mean not necessarily checking every number in there, but to be sure that whoever put the program together and the input data, knew what they were doing.

Just to give you an example of one process that can get screwed up pretty easily and that's flood frequency, flood flow frequency analysis. Even though they come up with Bulletin **17B**, which was put together by the interagency committee on hydrology, subcommittee on hydrology, the procedure is fairly straightforward and it's not real simple but it's straightforward and anybody can use it. But the problem is the data that goes into the system.

What it's supposed to handle is peak flow, annual peak flows, for example, on a river at a particular gauging station. But these peak flows are supposed to be unaffected by man. No reservoirs in the watershed, no diversion projects, no ice jams, or anything like that.

If you take the data published by the GS [USGS] in their annual reports and just plug it into the PC program, we can get a nice answer. The GS has arrangements, codes in there, that will tell you if the data is affected by something, if there is a reservoir upstream or something like that. But if people don't pay any attention to that, just use the data that is published, they can get some pretty bad answers.

They need to go back in and look at any of those answers or any of those floods that have been impacted by ice jam or by regulation of a reservoir or something like that, to be sure that they're using homogenous data. Not many people do that if they are not trained in the discipline. They don't realize they even have to do that. So that's where you can get into trouble with computers--even though I really didn't get into doing the actual computer work myself until after I retired from the Corps. I never had time to do computer analysis. It takes so much time.

I used to get after some of our reviewers out in the division offices because they got so enamored with computerizing and doing their own types of programming that they would forget about the fact that they were supposed to be reviewing the district reports. Not doing the work themselves but actually reviewing them and telling the district what they needed to revise and do over.

That's a tendency for people who get started to use computers, to get fascinated by them and addicted to them, and they forget all about doing anything else.

Q: Gee, if it can do this, maybe it could do that.

A: Oh yes, it's a great tool for "what ifs". You say, "Well, this is a good answer maybe, but what if I did this, maybe I'll get a better answer." You have a hard time quitting.

We had a guy in hydraulics back in Garrison who wanted to keep improving on his answer all the time. We could never get him to stop studying. He worked on the **same** level that I did at the time. But I use to tell him, I'd say, "Adolph, you've got this answer so close now how can you worry about getting any closer? You know that, or your answer isn't any better than that." "Yes, but if I improve this channel a little bit here I could probably get the water surface another hundredth of a foot lower." I said, "Well, Adolph you don't need to do that, it's not that important. Forget it and move on to another project."

But he wanted perfection and strived for it all the time. He was a real math genius. He was from Europe, I've forgotten which country he was from now. But he used to tell me how the European education was so different than the American. He says, "They don't teach you to really think in Europe." He says, "They taught you **all** the theory, and you learned a lot of complicated formula and all that kind of stuff." But he said, "They don't really teach you how to analyze problems and to make up your own procedures and that sort of thing." He said, "If you had things that were laid out, this is the way you did it and didn't try to think if there was a better way to do it. "

So he said he liked the education his daughters were getting. It was better than his education. He says, "Even though I've got a lot of math and that stuff, **I** still have problems with just making the right judgments on a lot of things. " That was interesting to **find** out that a guy would have that own self-criticism.

Q: Now that's an important step in anyone's education--to be able to criticize oneself.

A: Well, I was thinking about this book that was put together here.

Floodplain Management

Q: The book by Jamie and Dorothy Moore *The Army Corps of Engineers and the Evolution of Federal Floodplain Management Policy*? You wanted to talk about **H&H's** activities in floodplain management?

A: There are new programs in the agency. You asked me before how did the Corps respond from an H&H point of view to these new programs. Did they jump into them **enthusiastically** or drag their feet, that sort of thing. Well, it has been my experience that the Corps is very conservative on taking on new projects or new responsibilities. They go in very slowly--gradually, they'll get there but it takes them awhile. They just don't want to rush into something new, which is just the opposite point of view of the Department of Interior. If they even have an inkling that they've got some possibility for a new responsibility, they jump right in there and go full bore. They don't wait like the Corps does.

The Corps wants to be very sure that this is what Congress wants and very sure this is what the Administration wants before they really charge. A good example of it was when they got started in the floodplain management business, and the flood insurance program kind of went hand in hand. Al **Cochran** had really been interested in the floodplain

management. Since about nine tenths of the work in floodplain management was H&H--was doing H&H studies and then writing a report on floodplain information, he could have probably taken over that responsibility very easy. But he just didn't seem to want it. He was very reluctant about it. He would say, "Well, that's a different program than our traditional H&H." He wasn't all that enthusiastic about getting involved in it.

I know I kind of got assigned to work with the people in floodplain management. Whatever coordination was done, Al didn't even seem to want to be involved in it much. So that I did pretty nearly **all** the coordination. I went to some of the first meetings they had out in the field and so forth. I'd review the reports and make comments on the reports prepared by the field offices as part of my job.

But headquarters didn't really have much of a role in it because the districts did their own thing, really, in the floodplain information studies. They didn't have to be approved by headquarters, except the first few that came out to find out if they were doing things consistently.

James E. Goddard

But when they got [James E.] Goddard on special assignment from TVA [Tennessee Valley Authority]--I don't recall whether he had just came over from TVA or whether he had resigned or whether he had already left TVA then. But he came to the Corps and he was going to make floodplain management the theme for the Corps. He was going to convert the Corps from a structural agency to non-structural floodplain management activities, or at least that seemed to be his goal.

He would come over and argue with Al about things that needed to be done. Since I was sitting very close to Al, I heard all these conversations that went back and forth. Goddard would talk for awhile and Al would be sitting there, and he wouldn't be saying anything--they were both real strong, aggressive type people. One of them would talk for awhile and the other one wouldn't hear a word he said--it was pretty obvious because as soon as he got a chance to say something, he'd take off and go in just the opposite direction.

But, obviously they didn't hear what the other one said. They both had their pitch that they were going to make, and they weren't listening at all so that they never did seem to get together on anything. They were always battling about what probably should be done and how it should be done.

To give you an example, they hired this guy, Goddard, to do a job in the Corps, but they didn't put much supervision on him. They let him go ahead and do his own thing and he

got going. They set up a big meeting out in Chicago, and I went to that meeting. But at that meeting, Goddard was going to present the Corps' floodplain management program for them. Fortunately, let's see was it Tofani? I think it was Tofani that went to the meeting. He decided maybe--or maybe it was Reisler. I don't know, one of the two of them went to the meeting. But, I think it was Tofani.

I had told them before when I found out what Goddard was going to do out there that I thought it would be a good idea if someone from their office went to the meeting. I said, "Because he is talking to the whole country out there, and you guys better be there to see what he says and make sure that he's saying exactly what you want him to say. " So I don't know whether my talking to them had anything to do with it or not, but they went. So I'm pretty sure it was Tofani that went.

But, anyway, Goddard had this big program all laid out. He'd get up and start talking. He'd say, "Well, now this is what we're going to do. We're going to do this, this and this " He'd get about two-thirds through and Tofani would get up and say, "No, we're not going to do that." Goddard would look at him, "What do you mean we're not going to do that?" Tofani would say, "We don't have the authority to do that. Besides our policy wouldn't allow us to do that even if we did have the authority. " Everything, practically, Goddard said we were going to do, Tofani would get up and say, "No, we're not going to do that. " It was the damndest fiasco you ever saw.

There hadn't been any coordination between them before they went out to this meeting and here were all these people from the district offices expecting guidance on the floodplain information program. All they were getting were conflicts. It was really a sad deal, I think. It was partially due to the fact that they didn't **find** out ahead of time what it was Goddard was going to present. I think they just confused everybody rather than helped them.

But after that then they started paying attention to what they were doing and they got the ball rolling. It was just kind of an example of how people didn't have much interest in it when they **first** started so they assigned it to somebody that didn't even know the Corps' policies and what the Corps wouldn't do under certain circumstances. He was going by his experience with TVA and he assumed the Corps could do everything that TVA did. He was going to have the Corps do all kinds of one-on-one help and things like that, which the Corps didn't do in those days and they still don't do much of it. I don't think they're doing it at all now either.

But, anyway, it was a sad situation to begin with. It got going eventually, but it just took time to overcome all those hurdles. After awhile, the floodplain management people got

involved in the flood insurance working with HUD [Housing and Urban Development]. We did some of that, too, because flood insurance people didn't have much experience in hydrology and hydraulics. They had a few people but very few. They weren't really tasked to do technical studies. They were expected to use the advice and counsel of other agencies that had the technical capability.

So they called on the Corps for a lot of the assistance. They ended up making up their own minds, of course, what they were going to do on things. But they would ask us and often I got involved in it because I had been close to the program. There would be discussions on levee design and all kinds of things like that--expected probability and the statistical array--and that's been a controversial subject between the two agencies for a long time--about whether you use expected probability or not, and it still is. Right now, it's raising it's head again.

But that concept was that, given that you come out with your computed probability based on the record you have, there is a statistical technique for adjusting the results of that analysis based on the length of your record. The length of record is a measure of the accuracy of the results. If you get a gauge with a lot of years of record, you automatically assume that that is better than the gauge with a shorter period of record. That may not always be true, but over the long run that's true, of course.

So the Corps' concept was we use expected probability because if we get new data and it changes, it's more likely to change the frequency curve one way than the other way. It's almost assured that if you get enough additional data, the curve is going to move in one direction. The Corps uses that because they build projects and they do economic analysis based on what is going to happen in the future.

They try to apply all the things that they can reasonably estimate in the future to their analysis. When they design levees, the economics, the design level, and all that sort of thing is based on the expected probability. Even though the flood insurance people agreed that that was a good concept, they had some practical considerations that they couldn't let technical things get in the way of. That was, if you have people living in the floodplain, how do you define the floodplain.

If you use **information** that may or may not change the answer, it's a question about whether it is going to change the answer or not, they wouldn't be treating these people fairly. Because if they say, "We moved the floodplain way out here because we think that when we get new, more information, it's going to move out there. "The people would say, "**Well**, it's not there yet so why am I penalized, I can't build in this floodplain on my land because you've said the floodplain is here, I can't build anything. [You've] limited use of that land, you've restricted my use, and you don't have evidence that good to prove

that it is going to be out there someday. You know it may not happen for many years and I've lost the use of my land."

The flood insurance had a good rationale for saying, "Well, we're not going to use anything that we don't know today--pretty darn sure of today. If something new comes up and changes, we'll change the floodplain when that happens. " That's really not all that difficult to do, you just change the line on a map **although** it may have some strong impacts on people. It's not hard to do.

Whereas, if you discover that you made a wrong frequency analysis in designing a levee, you can't go back and tear part of the levee down because you thought it was too high or build it up higher either because you have to go through an incremental, economic justification analysis to get any addition on that levee which is almost impossible to get.

Making changes on a structural project are infinitely more difficult than making changes in an **information** report or a flood insurance report. That's really the basic difference in the two concepts and why they don't agree. Well, the flood insurance hasn't been as strong at trying to get the Corps to change as the Corps has been trying to get FEMA [Federal Emergency Management Agency] to change and to use expected probability.

The Corps, when I was with the Corps, we always tried to get them to do that because we said, "Well, in the long run if you do that you'll be saving yourself money because you won't have to change the floodplain and you'll be getting returns on your money that are more closer to the actuarial rate."

But FEMA says, "Well, it's not hard for us to change the rates either. If we're not getting the kind of money we need, why we'll just raise the rates." That's what they've done. They didn't really do a hard economic appraisal on what they should do to change their rates and so forth. They just said, "Hey, we're losing money. We'll increase the rates until we quit losing money. " That's the way they've done it so far.

Q: That's a very practical approach, isn't it?

A: Well, it's a simplistic approach and it works politically, too, I guess. It's a lot easier to put your books before the public and say, "Look, we're losing money. We've got to charge you more. " Then it is to say, "Hey, we may lose money if we don't raise our rates. We think we might. " People don't want to buy that, they'll buy the other concept. So, anyway, we get into those kind of differences.

Then it's hard for some people to understand that there is a reasonable answer for why they're doing what they're doing. It's different than what we're doing but it's still okay. General Kelly [Major General Patrick J. Kelly, Director of Civil Works, 1989-91] and FEMA had a meeting a while back to talk about this. They kind of agreed they would both go their own way like they have been in the past.

Right now I'm looking at something that the Corps put together, talking about this difference. Somehow FEMA is going to have to agree to it before they put it out, I'm sure. But it was written in a kind of a way that made FEMA look bad. Makes it sound like the Corps is right and FEMA is wrong. It should be written making both of them right and not trying to infer that one is smarter than the other or anything like that.

It's not going to sell. Whoever wrote it wasn't thinking about that, I don't believe, when they put it together. Either that or they just didn't recognize the implications of what they said. But it will be changed I'm sure.

Q: The whole subject of floodplain management, you made the point that that was something that was relatively new to the Corps, so new that they brought a consultant in. How, over time, did the Corps acclimate itself to that responsibility or did it?

A: Well, you see, through the years the floodplain management in the planning side of the house, the feasibility reports and so forth, they do go into the full scale review of different options for reducing future flood damages. But the actual group that Jerry Peterson is in charge of right now, there was a time **when they** weren't sure where they were going or what they were going to do because the need for the flood information reports, which they were producing, was kind of going out of business because FEMA was preparing all the flood insurance studies.

FEMA was doing the thing that the Corps had started off doing in flood information reports. As a matter of fact, a lot of these flood information reports that the Corps did early were almost like putting a new cover on them and making them a flood insurance report. I mean as far as the technical work is concerned, they didn't really have to redo it. They just used what was in there.

So after the flood insurance program got real active and it was obvious that FIA [Flood Insurance Administration] was going to do all these reports, then there wasn't really a role so much for the Corps anymore. So there was a little question about what their role was. So they've been getting into other areas that they didn't do before. They've done studies on evacuation planning from communities and things like that that they had never done before. Certainly a worthwhile effort.

But it did change when the flood insurance program became strong. Here you got into this other problem of using expected probability. The Corps people didn't want to do a FEMA study on their **contract--FEMA** studies, all their studies are done by study contractors. The Corps does the studies. The USGS does some of them, the SCS does some of them, and then a lot of them are done by private contractors.

But the Corps wanted to use expected probability in their studies. FIA says, "No way. If you're going to work for us, you're going to do things the way we want it done." It was a tough job. I know Jerry [Peterson] used to have a real battle with a lot of the districts. He'd come see me, "Hey, what can I do to get these people." I'd have to call up and talk to them and say, "Hey, if you guys are going to get this job and do stuff for FIA, you've got to do it the way they want it done. You don't necessarily have to endorse it. You just do it the way they want it done. Just say that you did it right as far as it goes." But because you would do it differently doesn't mean that what they want isn't okay for their purpose.

Well, FEMA even went so far as having the National Academy of Sciences review that expected probability concept. They came up with the conclusion that there was no statistical reason why FEMA should use it in their program, in their flood insurance program. But, anyway, they said it was a worthwhile concept, there just wasn't any rational way of saying it had to be used in a flood insurance program.

Even to this date a lot of the problems that FEMA has with the Corps are concepts of the Corps people about **FEMA's** capability. FEMA has had technical evaluation contractors and that's who I'm working for, one of those right now, who review all the work of the study contractors. They try to decide whether there are any problems with what the study contractors have done.

Of course, whatever they come up with for a flood insurance study is always subject to challenge by the community or by other people. So if things don't come out the way the community wanted them to or think they should, they can always challenge it or get their own consultants or do their own work and try to prove that FEMA didn't come up with the best answer. A lot of times FEMA changes answers when they review the other work and say, "Well, that's better than what we had done and we'll make a change for you."

Occasionally it gets to be a real tough battle when the political business gets involved. The community will get their congressman or their senator to say, "Hey, why? This area shouldn't be in the floodplain." The congressman gets involved, and he fusses at FEMA because they're not doing what the community wants. So FEMA has a tough time dealing with the senator or congressman.

Anyway, that's a little of the background on some of the problems we had with FEMA and the insurance program. Another agency that had a lot of dealings with the Corps was the USGS. The USGS used to, and still does, do an awful lot of the stream gauging that the Corps paid for. That got to be a little bit of a controversy for awhile there because, as I mentioned, the GS is very eager to promote themselves as being something, not just a data collection agency, but as a source of technical knowledge, of all types of technical knowledge.

Through the years, I served on the Inter-agency Advisory committee for the USGS, this was supposed to be an independent committee that gave advice to the USGS on what the other agencies thought they should be doing. There are Federal laws that established the USGS and what their role was going to be.

Our position in the Corps was, "Well, your primary goal was data collection as far as we're concerned. So we would like to see you spend as much money as possible on data collection because there is not enough money to go around to do all the data collection that needs to be done." The GS was trying to get away from this role of being strictly data collection and wanted to have a lot of good technical experts on their staff that did studies as well as just collect data. So they gradually started getting various expertise.

Ground Water Studies and the United States Geological Service (USGS)

Now, one area that I felt very strongly needed expertise was ground water because nobody else was doing it. One area where the Corps did very little work, primarily because we weren't involved in the water supply too much--only so far as reservoirs are involved. So we didn't do a lot of ground water studies. When we needed to know something about ground water, we wanted somebody else to be able to provide that guidance to us. The GS did that through the years. They developed their ground water expertise. Nobody seemed to have any difficulty with that.

A lot of the private communities needed data like that in trying to decide where they were going to get their water supply, ground water, or if there wasn't any ground water, then they would have to go to a surface water source. But they were able to get information from GS on available ground water, yield, and all so forth.

Periodically I'd get requests from the GS asking me what kind of technical expertise would you like us to be doing work on so that we can help the other agencies with our technical expertise? I'd write back and tell them, "You don't need to do any technical work in surface water. We'll do that ourselves. You just keep the data coming, and we'll do our

own technical analyses." They didn't like that kind of an answer, of course, because it was in a way putting them down as far as the technical part.

I don't know how many people, but I know a lot of people, felt that their primary role should be in the data collection, and it still is today. But I had my only significant confrontation, I think, with another agency [with USGS]--somebody on my own level from another agency. But it was one of the fellows from the GS--we had a problem with funds. We were putting out a lot of money for data collection before trying to figure out how we could cut back on some of those funds. Just spending too much money, they said.

One of the districts, Rock Island District, decided that they should do their own data collection. That they could do it cheaper than to have the USGS do it. There got to be a big controversy about whether they should do that or not, and the GS objected strongly to it. But the district felt real strongly that they wanted to do it themselves. It finally got resolved where they--the GS--continued to do it, I believe, was the final outcome.

But at that same time, it came up that the operations people were hard-pressed for money. They said, 'We've got to cut back on some of these areas. What can we do in the data collection area?' Well, the Corps was paying for data collection, but the GS was doing it.

So we got people from the GS to come over and talk about what we could do to cut back on **funds**. We need data, but we can't be as generous with the money we've had in the past. What are some of your suggestions? They said, "Well, there are things you can do. We can still get the data, but we don't need to process the data as fancy as we do when we put it in published reports. We could go out and still get the data and you would just use it. You'd process it yourself or use it as you needed it. But you wouldn't archive it in the nice, neat manner that we do it. That would save you so **much--20** percent or something like that." Now it wouldn't get into the GS records because it wouldn't be archived in the proper manner and the established procedure.

So headquarters level decided, based on this advice from the GS, that we could still do that sort of thing. I signed a letter to the field offices saying that when you review your annual budget for next year, we know that you're strapped for money, why [not] consider this concept of getting the data but not processing it as refined as it has been in the past.

The head of hydrology over in GS hadn't really been involved in these discussions, it was the people that worked for him. He saw that letter with my name on it, and he looked at it and he blew his stack I guess. He called me up, and he called me every name in the

book. How I was destroying the data collection program, the government's agency program, and all this--he just run me over the coals.

He wouldn't even listen to me when I told him, "Well, we're strapped for money. We've got to do what we can. Besides, this wasn't done unilaterally. Your people have been over here for four or five different meetings talking about it. It's nothing new to your staff. Maybe you haven't been told about it but everybody that has been over here knew about it." It's nothing new, but I couldn't even get a word in edge wise with him.

But then I finally said, "Well, if that's the way you feel about it, then we'll just let it go." He was so incensed that he called up the Weather Service and tried to get my counterpart over there to protest what we were planning on doing also. He wouldn't do it. So he tried to get him fired. I mean he was the GS guy who had been switching funds from data collection to technical analysis. So he was raising hell with me because I was going to take some of the money away from data collection. So it was just very difficult for me to swallow.

Q: So he was really playing games?

A: Well, he was putting it all on the fact that they weren't going to be able to get as much data in the future, it was all going to be my fault. It wasn't his fault, it was my fault. But, anyway, I let it go knowing that GS was going to come over, I assumed, after listening to him, that there would be a plea from them to our generals anyway. Right away I went up and talked to General Kern [Brigadier General Richard S. Kern]. He was a Deputy Director of Civil Works at the time (1980-81). I said, "Well, here is what happened." I gave him all the background on it. I said, "They're going to be over here for sure. So you ought to be aware of it and pass the word on up the line so that you're prepared for them when it happens."

Well, they came over eventually, but they had the Chief of Hydrology muzzled. They weren't going to let him talk because I told them ahead of time, "When you come over here, if you let him talk to one of these generals like he talked to me, you probably won't have any more funds from the Corps of Engineers for stream gauging."

Anyway, they kind of muzzled him when they came over. So he didn't get to say very much. But he did say enough to aggravate the general, so that they weren't too happy with him either.

Q: About what time was that. What year, do you remember?

A: Oh, I'd say that wasn't too long before I retired. Maybe a couple of years before I retired, in that time frame. But it was a time when funds were tough for operating the reservoirs, and that was where a big chunk of our money was going. We figured, well, if we don't attack that chunk, why it's not going to do much good to try some of the others.

We wanted to have our data archived, too, just like everybody else, but if we were going to have to pay for all of it, maybe it wasn't going to get done. It would be available in our offices, but just not in the same format that it was with the GS. It is one of those things you feel bad about having to do, but I felt pretty bad when I would go to these annual programs of the USGS and see them sticking more and more money into technical analysis and less and less into data collection.

I had some other troublesome experiences with them. I got along with the people in the GS very good. I had a lot of really good friends over there. But every once in awhile, I'd get put out with them about their aggressive nature for doing things because they weren't slow like we were when they would try to develop a new program or doing something new. Another example of their aggressiveness was in the water quality area. We were kind of slow working into the water quality business, but not the GS.

They had two advisory committees. One was a Federal advisory committee and the other was a non-Federal advisory committee. The only people on the non-Federal advisory committee were from universities, states, and communities. There were no other Federal agencies represented.

So what the GS presented to them was not always the same thing they presented to the Federal agencies. The GS would present the Federal agencies with their programs, and what they were planning to do. But the thing that kind of gripped me, well, a lot of times, what we in the Federal community got from the GS was something that they were already committed to. It wasn't something that we could change. There was no way we were going to get a change because it had already been done.

But when they worked with the non-Federal sector, that committee, they would present proposals to them for what the GS might be doing and find out how they reacted to those. Obviously, if you go to people who are looking for information and somebody offers to go out and get it for you and then don't charge you anything for it, you're going to say, "Yes, we want that." Hell, they'd take that as a mandate for doing that particular work. Well, that's what they did with this water quality thing, and it ticked me off for some time afterwards.

But they went to them and asked them, "Hey, don't you think it will be good if somebody really analyzed a watershed, the whole watershed, to **find** out what you can do to manage the water quality and make sure that it doesn't get bad by storage in reservoirs or by pollutants, sort of look at the whole thing and not just one piece at a time." Well hell, all the people said, "Yes." Every one of them said, "Yeah, that would be great."

Well, the **GS** went ahead and went to Congress and said, "Hey, we got a mandate to go ahead and do this sort of thing." But they never even mentioned to the Federal committee that they wanted to do this sort of thing. So, somehow they got money assigned to do this sort of analysis.

The **first** I found out about it was I got calls from people in the Corps field offices asking me what these guys in the GS were doing coming in and asking about reservoir operation rules and talking about modifying the water control management plans of the Corps. I said, "I don't even know what the hell is going on." That's the **first** I found out about it. They would go to our offices and find out how the reservoirs were being regulated.

Then they were going to take those water control plans and see what they could do to modify them to improve water quality. They went out and hired a bunch of experts, people from universities, who were really smart guys with this sort of studies. They had this whole program going. It was on the **Willamette River** [in Oregon], I think, their first study.

But, anyway, when I found out about that I about blew my gasket. Here are these people out there going to tell us how we're going to regulate our reservoirs, and they haven't even talked to me about it or even told me they were going to interview our people. The next time we had a meeting, I got all over them about them. They said, "Oh, no, we thought you knew all about it." How were we suppose to know?

But they never apologized or anything, they just went on their merry way and they went on and did other watersheds. Well, obviously, after you've assembled a group of experts like that, hired them and trained them to do the kind of work you want done, you're going to **find** more work for them or fire them all. So it was obvious that they went ahead and did more studies. But I would have rather seen that money gone to data collection.

I'm not arguing that what they did weren't good studies. It was just that I don't think they would have gotten a vote of confidence from the Federal committee that they got from a non-Federal committee. Because the other Federal committees would say, "Yes, it would be good to do that but it ought to be an interagency effort, not a USGS effort, and use the capabilities of the other Federal agencies, particularly reservoir reservation like the Corps' projects and the Bureau's projects."

The GS weren't experts in water control management. They hadn't even asked us into the thing until they got the go ahead on the project. So that kind of thing really irked me. But, as I say, individually I have nothing but the best of feelings about all of my relationships with the GS.

The Bureau of Reclamation and the Soil Conservation Service (SCS)

Q: Well, if you had problems with GS, you also dealt with other Federal agencies. You've said Interior was very aggressive. What about the Department of Agriculture and the Soil Conservation Service? How were they to deal with? They must have had some significant flood and water quality issues to deal with.

A: I'd say our major differences probably with both the Bureau of Reclamation and the SCS are when communities or state organizations would want flood control projects and they would try to play one agency against another really. They'd go to one agency then they'd go to the other agency, and they'd try to get the Bureau to study a project for them or they get the Corps to study a project for them or get SCS to do work for them. There were many examples through my career where one agency had started doing an investigation for a particular watershed, and that ended up [with] another agency taking over the project.

I remember one in particular. When I was doing my paper on water supply at Catholic University, I was checking out a lot of things. One of the projects down in the southwest, I've forgotten the name of it right now, but the Bureau of Reclamation had studied it for irrigation. They had added some flood control, which the Corps had developed for them, the benefits for it. But they couldn't come up with an economically justified project, so they dropped it.

The Corps, at that time, was able to take benefits for water quality. Now I don't know just why the Bureau didn't have that option then, but apparently they didn't have that option. So the Corps, by adding water quality as a purpose, was able to come up with enough benefits to make an economically justified project out of it. There was some water supply on that project, too, which was a part of several purposes. When the Bureau studied it, they couldn't make it economically feasible but the Corps was able to because they handled the additional benefits.

There was another problem, not just with the Bureau of Reclamation and the SCS on the design procedures, because the Corps was designing all their projects for the probable

maximum flood. Although the SCS said they were designing theirs for the probable maximum flood, they didn't have any freeboard. So they could build a project cheaper than the Corps could because they didn't have that extra 3-5 feet of freeboard on the top, which is quite an additional expense. So they might be able to design and build a project cheaper than the Corps could with a little less design criteria.

That was probably one of the biggest areas of contention. We were having the same problem as I had told you last time with the Bureau about their analysis for a probable maximum flood--coming up with a lot smaller flood than the Corps. So that through the years was a big problem, but we got that straightened out.

When we went into the dam safety of non-Federal dams [program], all of the dams that the SCS build, or practically all of them, there are a few but most all of them, they turn them over to a local interest. Some conservation district or something that takes care of them and operates them after the SCS builds them.

So they were all non-Federal dams in a sense. They all had to be investigated by the Corps. When the Corps looked at them, they said, "They're not up to the normal design standards." If they don't have freeboard on them, that was our first approach to it. Rather than have all of these SCS projects come under the blanket of disapproval because they didn't have any freeboard on them, we finally compromised with the SCS and said, "Well, we'll argue that since your dams are small that you don't need freeboard as bad as the Corps does on its projects." It wasn't a very good justification but otherwise all of them would have had to be listed as not being up to par. We didn't want to make the SCS look bad.

So they just politically agreed that as long as they were designed for the probable maximum flood, even if they didn't have freeboard on them, we would accept them as being up to standard.

Q: Did that kind of criticism lead them to make any changes in their design criteria?

A: Not the SCS, no.

Q: Still no freeboard?

A: Well, they have a different concept of design. They have a design flood that takes care of the flood storage. Then they have what they call the spillway flood or something like that. It's the probable maximum flood, and they make their spillway big enough so that

they route that flood through, the probable maximum flood, it comes up to the top of the dam. Then they don't have freeboard for wave action or anything like that, which the Corps does. But that's their policy.

I guess they've had a lot of their dams over top, and they haven't failed. They have waves washing over the top, well, there's a few of them that fail but not very many. So they **feel** justified in not having to put freeboard on.

Q: What would be the normal size of a Soil Conservation Service dam versus a Corps' dam?

A: Well, it's governed more by drainage area. They have a limited, forgotten what their acreage is now, but the size of the watershed is what governs where they do their studies. They're suppose to do their studies in smaller watersheds and rural areas of course.

Q: So they're not really very big.

A: No, they're not really very big because the watersheds are usually not that big. But both of us get involved in doing some urban dams occasionally.

Section 221 Agreements

Q: How much of a different problem does that inject into your work when you go to an urban area?

A: Well, when we're working in an urban area, sometimes a flood control reservoir is used as a means of protection in lieu of a levee. You build a local flood protection reservoir. But it gets a little controversial when it comes to building reservoirs. Whether they have a Federal interest is kind of a ticklish subject in the Corps of Engineers--what is a Federal interest?

Anyway, if you build a small reservoir and the beneficiaries [are] not very widespread, they're all local, then it becomes a little questionable if there is a Federal interest there or not.

But there have been some small urban reservoirs built by the Corps. We had a strange one **up** in Montana--it is Havre, one of those communities in northern Montana. The **Corps** built them a flood protection dam, small dam for flood protection with a small gated outlet

works on it, but no storage for anything but flood control. It's suppose to be kept empty all the time except for storing floods.

Well, they went up there for the annual inspection one time and found that the community had closed the gate on the outlet works and filled up the reservoir with water and they were using it for recreation. Everybody was swimming and boating and having a big time, and there was no storage for control of floods. Obviously, the community didn't understand how the project worked or were not paying any attention. They just thought, "Well, this would be nice to fill it up for water and use it for recreation." So they did.

Q: Now, in a case like that, they have to empty that thing out, don't they?

A: Well, you see the Corps has a limited authority on what they can force the local community to do. They write them a letter and tell them that they're not in compliance with the rules and regulations for the way this project is supposed to operate. If they don't take care of it, they write them a letter. They have at least an annual inspection where they look at the project and check to make sure that it's being taken care of. Then they write them a letter protesting things that haven't been done.

Many years ago, they didn't really have any legal authority to make this community comply with those requests, other than the fact that the Corps would say, "Well, if you ever need any other things from the Corps, why don't come looking to us because you're not going to get them because we know from experience you don't cooperate. "

It's been a few years back, they came up with these Section 221 agreements where the community has to sign off and it's a legal binding obligation where they agree to do all the things that the Corps says need to be done to operate and maintain this project. If they don't do them, why the Corps can force them through the courts to comply with the requirements. But I don't know that the Corps is--and they have yet to have their first case where they actually force the community to do something.

But they bring a lot of pressure to bear on them now that they have this capability to go to court and force them to do things. Usually, they can get them to comply by just telling them that they're going to force them to do it, and then they comply. But they didn't have that threat before that they could use.

So it was difficult in earlier times. They'd tell them, "Hey, you're not mowing the grass, you're not cutting down the brush, and things like that." Or, "You're not repairing the motors, they don't operate. You've got gates locked and there are no keys to the locks. "

Things like that. They'd never be able to get them to take care of problems if the community was lax and didn't want to do it.

They'd go out and you'd see an inspection report come back one year, maybe two or three years in a row, with the same kind of complaints about their community not taking care of things. But, I think, because of this 221 agreement, that it's getting less and less of a problem.

Q: Now the Corps has a way of compelling compliance.

A: They can force them to do it now that they've signed the agreement.

Hoodplain Management

Q: We were generally talking about the floodplain management. Was it difficult to get the Corps to change and pay more attention to that?

A: Well, Goddard left and things got more on an even keel. They had a branch of the planning division assigned to do that, to promote that kind of activity. George **Phippen**-- I'm sure you remember George.

Q: Yes, I knew him.

A: He was in charge of it for several years. He was a go-getter; he got a lot of things for them to do. A good share of their work was with FEMA, just getting steady contracts and helping FEMA through the years trying to get the Corps' studies done, the way FEMA wanted them done.

But there was no longer this demand for the flood information reports as such. They were being done now as flood insurance studies. Then they had a program where the community could get help from the Corps. If they were having flooding problems, they could come to the Corps and get some advice. I understand now that they're going to have to pay for it from now on.

Last fall, when they agreed on the budget, one of the things was to start charging communities for that kind of assistance. But they used to have a program where if a community came to the Corps and said, "Hey, we're interested in trying to help ourselves

fix up our flood problem. What could we do?" The Corps could spend some time and money helping them out, giving them advice--and providing them with a flood information report that showed them what areas were subject to flooding and the probability.

Then they'd say, "Well, here are some things that you might want to do to alleviate some of this flooding. You might improve this channel. You might divert some of the water over in this direction. You might build a small retention project" or something like that.

But now they're going to have to pay for that, I guess, under the present process. Of course, that's kind of in keeping with the new planning policies anyway, under the new, I think, the '86 Act [Water Resources Development Act of 1986]. The Corps, now when they do a **recon** [reconnaissance] study, the community has to pay 50 percent of the cost of it. Well, they never use to have to do that. It kind of puts the community on the spot. Do you really want us to do this? If you do, you're going to have to pay money up front.

Q: Well, that's the whole purpose of the Act, to get them to share the costs.

A: Well, to make sure that they're not just pulling your leg or something.

Q: Yes, getting a freebie.

A: They want to be sure they're really interested in doing something. Because a lot of people or a lot of **communities**, after the Corps has gone through all the process of doing an **in-**depth study and gotten a project authorized, then they say, "Ah, well, we didn't really want one after all." That's a lot of waste of money.

Q: It's not wasted if it's not your money.

A: Well, yes, from their standpoint probably. But from the government's standpoint, it's not a very efficient way of doing business.

Q: You were talking about floodplain management and the whole issue of structural and non-structural flood control. How much involvement did the hydrologists have in that? Did they get into that issue at all?

A: Well, hydraulics got involved in a lot of the planning [of] channel improvements, for example, even though channel improvement is more the same concept as a non-structural. You can improve a channel and do it in a manner so that it still looks good. You're getting flood control by improving the capability of the channel to handle more flow, but you're doing it in an aesthetically pleasing manner, not the traditional concrete sides and bottoms, but with small channels in the bottom and with walkways along the side and different kinds of environmental plantings to make the whole thing look beautiful.

To do that, of course, they have to have a lot of hydraulic studies on the impacts of having or not having different kinds of improvements. Of course, they have to know what size floods they can handle with these type things, which is all part of the hydrology and hydraulics aspect. So as long as there is any analysis of what is going to happen to the water, why the hydrology and hydraulics people are involved in it. So it doesn't really make too much difference whether it's a structural or some sort of a non-structural approach to the problem.

One area which I've been getting into with my work now is flood proofing. It's part of the so called non-structural. It's really a minor structural element of the non-structural procedures where an individual is protected by raising or by sealing the house or by moving it.

There are a lot of different techniques you can use for flood proofing an individual house. People in the Corps--that's Jerry Peterson's group--have what they call a National Floodproofing **Committee**. This committee is trying to promote ways and provide help to people so they'll motivate them to go out and do flood proofing.

That's an area where the Corps has been giving lip service for a long time. But when it comes right down to actually doing anything constructive, flood proofing for an individual project, they don't do it. There are a few places where it has been done, and it's been investigated in a lot of planning reports but the way they investigate it hardly ever seems to come out feasible. I think, personally, that that's one of the areas, untapped areas, of reducing flood damages in the future.

We're not going to be building very many more big projects because they're hard to justify and most all of the traditional structural flood protection works that are justifiable have been built. The ones that are marginal, they probably didn't get built. So what are you going to do about these people that are staying in the floodplain that are located in the floodplain and are going to stay there. They're not going to move on their own probably unless they get some sort of motivation to do it, and that's the whole idea of this flood

proofing committee--to try to figure out how to motivate these people to do it themselves.

Well, I made some suggestions to them about what the Corps really needed to do if they were serious about flood **proofing** and that would be to modify the planning procedures so that they could really attack the problem. They have all the authority to do it, it's just that it's not politically or traditionally the thing the Corps does. They haven't really geared themselves up so they could go in and do a lot of assistance in flood proofing.

What they should do is have a **community** that has a lot of buildings in the floodplain, and [they] get this community to agree, or get all these people to agree, that they're interested in flood proofing. Then [they] go to the Corps in the traditional manner and say, "Hey, we've got a flood problem, we can't handle it. We're not in a position to handle it. We need a Federal project here. But the Federal project that we perceive being here is flood proofing, is mass flood proofing."

Then the Corps would come in and do a **recon** study along with them. But if you go through the traditional process, it's going to take you at least 10 years, maybe **15** years before anything happens. By that time the people that signed up for the thing are probably not even going to be there anymore. You need to have some sort of a process that will move quickly. They do have authority for that. They have their small flood control project authority, if it was funded adequately they could actually do a community under the small flood control project, and do it rather quickly. It wouldn't take so long.

The way I looked at it anyway, you don't have to analyze each one of these houses on the same basis, by giving them all the same degree of flood protection. As far as I can see, all you need to do is make sure that what each individual house does is economically justified by some means. I don't think you really need to do a full **blown** in-depth financial feasibility study. There are ways you can look at it very quickly and inexpensively to find out **what** you can do there and how much money you can afford to spend and still be justified.

If they [the Corps] had a more simplified method of looking at the economics of each one of these, they could go in and, with the help of the city, of course, which is contributing **50** percent of the cost on this study, they could look at each house and say, "We'll protect this one for two feet, this one for five feet, this one for three feet. We'll raise this one above the floodplain because all these, when analyzed individually, are economically sound. It's a good thing to do. "

The Corps could actually have all this stuff built. The Corps could manage the thing because private individuals really don't know enough about it to know when they're getting a good job done. Besides that, if the Corps has many houses flood proofed all at

the same time, there is a big economic advantage to it. If you're doing things on a **large-scale**, the contractors will go in there and do a whole bunch of jobs a lot cheaper than they would do them individually. So there would be a lot of advantages of working that out.

But here I think the Corps is traditionally dragging their feet because it's not the kind of thing they've been doing. They say, "Well, we'd have a hard time proving the Federal interest" or "You're not coming up with the same kind of levels of protection" or "If you exceed the level of protection, the people are going to get damaged more than they would have otherwise and things like that."

Well, those are all legitimate concerns all right, but I still think that overall you could reduce the future flood damages tremendously and reduce the amount of money FEMA has to pay out for flood insurance and so forth. It just seems like an area where they have to be more aggressive than they have been.

Q: Is this part of the **mind-set** of the Corps that is so much into the big project that they can't see these little things as being part of it's mission?

A: Well, the sad part of it is, too, that in flood proofing, generally speaking, that people that have money are the ones that are going to be benefitted by it rather than the poor people. Because what happens is that if you've got a real expensive house located in the floodplain and you can show that damages to it are going to be pretty extensive, then you could afford to spend a lot more money fixing it up, protecting it.

Whereas, if you're living in a disadvantaged area and nobody has any money, the houses are not very expensive to begin with, so you can't afford to spend too much money on them. Then, if you do spend money on them, the homeowner can't afford to put up anything. But anyway, all the authorities are there, if they could get enough support for doing it? I think, traditionally, they've found out that they don't get enough, really enough, support for doing flood proofing to make it a thing to push.

But, from a practical standpoint, I just see it as one of the best ways to reduce flood damages. It's better than just keep paying insurance claims to these people year after year. Even if you cut out the payments to them to every five years, once every five years, instead of every other year or something, you've gained a lot.

Well, anyway, I was of the mind-set previously that you could go in and build a levee project for a lot of people [and that] was much better than fooling around with flood proofing. I still believe that. But there are so many places where you can't build a levee.

Even if you can build a levee for a good portion of the town, there are other parts of the floodplain that don't fit within that levee, that would not normally come within the protection of that levee, which might be a second part of the overall flood plan.

But, anyway, I was suggesting this to the flood proofing committee. They thought, "Well, that's not within their purview anyway, it's way beyond the authority they would have for doing anything like that. It would have to come all the way from the Chief's office, at the top level of the Chief's office, to investigate the possibility of a revision in policy in that area."

But, I think, as we've been talking, that the Corps is just very conservative. Unless they're pushed into it, **they** probably won't ever do anything much about it. Eventually, they might get pushed into it because there are a lot of states that are pushing flood proofing. They would like to see the government get more active in it. They try to do all they can but are meeting with quite a bit of resistance.

The Feds, like the Corps, are willing to do things like write documents about flood proofing. [Tell them] How you do it. Where to get help, if there is any help available, all the processes you need to go through, the reviews and the studies, the good and bad, and all that kind of stuff. They're willing to do that sort of thing and do research on what kind of flood proofing works and that sort of thing. But to actually go out and do it, they're not too aggressive in that area.

The Federal Engineer

Q: Well, like you say, they are particularly shy in some areas. I think you were probably there when they were pushing the idea of the Corps as the Federal Engineer. Then Heiberg decided that was being presumptuous, and they better not push that because other people like BuRec Soil Conservation Services, FEMA, and Department of Energy also had engineering talent. So they pulled back on that idea, but it was one of the relatively good ideas that they had.

A: Well, from my standpoint I would think that even, particularly in years gone by, they could have taken that philosophy without too many criticisms or pushed it pretty hard without too many people challenging them because they did have more staff. For example, the Bureau of Reclamation could have said, "Well, we're Federal Engineers, too." The Corps could say, "Well, yes, you are Federal Engineers, too. But we are the Federal Engineer because we cover the whole country, outside of the country too. We're not confined by one part of the country like you are."

The SCS is confined to small rural watersheds. Obviously, they 're not the Federal Engineer. FEMA, they look to us for their technical expertise and engineering. They couldn't be considered. Who else could be the Federal Engineer but us. I mean they could present a pretty good case for it. Now, I don't know whether they can do that so much anymore because they're not building the big projects, or at least not as many as they use to.

Hydropower --the Bureau has done a lot of that, but the Corps has done a lot more when you get around looking all over the country. That was a pretty active area for awhile there, when they were trying to add hydropower to all the existing projects, where private [owners] could come in and get a right to develop the power at various Federal sites.

Some of these companies went in and grabbed up the rights for all kinds of projects, whether there was any possibility of getting power there or not, just to be sure, just in case. Of course, they lost them after awhile because they were limited in how long they could take to develop the site. But some of them went out and grabbed up a whole lot of the Corps' projects, even the locks and dams, some of them didn't have much head at all.

Federal Energy Regulatory Commission (FERC)

Q: I know during the energy crisis there was a lot of talk of that and then in the early 80's there was a lot of talk about hydro.

A: We were fairly active in that program. In hydrology and hydraulics, we had hydropower as one of the things that we were involved in. We dealt with the Federal Hydropower Administration or **FERC**, Federal Energy Regulatory Commission--can't even remember the names of the agencies.

Q: Federal Energy Regulatory Commission.

A: Yes, the Regulatory Commission. Whenever there was a big private hydropower dam going in some place, they always got the Corps to do the hydrology and hydraulics connected with building that project and see what impacts it was going to have on floods downstream. In some cases, they had to add storage to their projects to take care of the increase in flow they were going to cause if they didn't have some storage. Our people in hydraulics and hydrology would do that assessment.

We had to maintain some expertise in hydropower for evaluating other people's projects besides evaluating the potential for our own projects.

Q: Were there any different techniques you used when you were doing that or was it just a different type of thing?

A: Well, that was primarily what we were involved in just looking at the hydrology and hydraulics of the projects. When we were doing our own, we were looking then at size of plants, based on the flow and the head. What size plant could you support and maintain firm power and secondary power and all that kind of stuff.

But when you looked at the others--oh, we got involved, too, of course, when they wanted to modify a Corps project to put in hydropower. They would come in with plans for what they were going to do with a Corps project to add the hydropower to it. Then we'd have to evaluate the practicality of doing what they were going to do.

We might have a big flood control release conduit. They might want to cut down the size of that by putting in a pipe that went over to a hydropower plant. To get that pipe in they had to cut down the size of our flood control outlet, then we'd have to try to decide whether that was an acceptable thing or not.

Obviously when we designed that flood control outlet, we wanted it that size for a reason. Then for them to just come along and say arbitrarily, "We are going to cut the size in half," doesn't fly. Either we made a mistake in the first place by making it too big or else something was wrong if they could go in there and just reduce the size of it without making some studies to be sure that there wasn't going to be a serious impact on the floodplain. So then we had to do those kinds of studies.

Then there were structural studies, too, of course, to be sure that when they made their modifications they weren't screwing up the stability of the plant that was there.

Q: Were a lot of the Corps' projects subsequently modified to have hydropower facilities--I don't remember many that they did.

A: There were a few. I don't think it was an outstanding number but there were several.

Q: I mean that seems to me to be one thing that has to be decided from the beginning or else you're going to have some problems.

A: Well, the thing that was important about it was if they could get the thing going before the Corps got their projects done. We had projects that were in the process of being designed and built,. If our project didn't have hydropower in it, if this non-Federal interest could get their facilities put together and designed fast enough so that it could be worked into our design, then it was much more acceptable, like you say.

But they were often slow in getting it there, and the Corps couldn't wait for them. It made a big difference in the cost of the project, too. If you could do it initially, you can design it so it doesn't cost as much if you have to retrofit, you have to go back in and redo something. So there were a few cases where they were having some trouble--that was when Gianelli got involved. He was involved in trying to decide when the time was that they had to have their certain things done before the Corps could accept them as a partner. It got to be pretty controversial on some of them.

William R. Gianelli

Q: You've mentioned Gianelli, I imagine Bob Dawson also would probably fit in your thinking. Prior to Gianelli, do you recall the Assistant Secretary for Civil Works having much impact on any of your work or any of the policies?

A: Well, they've always had some impact, of course. But, I think that **Gianelli's** was probably the strongest we ever had there as far as really telling the Corps what they were **going** to do and what they weren't going to do. He was dictating right and left how the Corps was going to function. He took a real personal interest in a lot of the details, which some of the ones previously didn't.

I remember working with the Assistant Secretary's office on some of our policy for urban development, urban studies, what constitutes Federal interest in an urban study.

To tell -you the truth, it was kind of a strange thing to **do**, but OMB [Office of Management and Budget] wanted a technical procedure for turning down cities on a flood control project. They said, "If certain conditions prevail, then you're going to be responsible for taking care of it. We'll consider that as the normal storm drainage for the community. If other situations prevail, then we'll call it a flood control interest and the Corps **can** get involved in it's normal flood control activities. But if you don't meet this criteria, why you're going to have to do it yourself." You may use Federal money from some other source but not from the Corps. You might use money from HUD or redevelopment or that sort of thing, but it wouldn't be a Corps project.

We come up with, well, let's see, who was the assistant secretary? I can't think of his name right off hand, but he came up through the Corps. He was one of the few that actually worked for the Corps his whole career. He worked over at the Rivers and Harbors Board.

They were looking for some technical assistance over there, and he said, "Well, I'll try it out and see." He applied for a job, and he got the job and shortly after he had been there for, well, he'd been there for some time. But the assistant secretary left, and he ended up acting for awhile and then he actually got the job for awhile. Then he went over to EPA [Environmental Protection Agency], I think, when he lost the job. But what the heck was his name?

Q: Well, he must have been one of the early guys because he certainly wasn't one of the more recent ones.

A: Gosh, I know--Jack--I just can't think of his name right now for some reason. But he was one of the fellows that reviewed projects over at the Rivers and Harbors Board for quite a long time. I remember when he was working for the Assistant Secretary of the Army, [they] told him there was a change in his job from a conventional civil service job to one of these political appointee jobs. Ford, Jack Ford.

Jack was saying, "Hey, I don't want to be a political appointee, I want to stay." The A.S. told him, "Hey Jack, everybody else can be fired anytime. Why are you so concerned about it? Just because you've been working for the Federal Government, if you have any confidence in your abilities you shouldn't be worried about whether you can be fired tomorrow or not." He said, "You're going to be on one of these Presidential appointment-type jobs."

Then when he became acting Assistant Secretary and, I think, I'm pretty sure he actually got the job for awhile. Then the Presidents changed or something, and he went over to EPA. But I worked with him on this urban drainage thing to come up with hydrologic criteria that would define when the Federal interest ended and where it began. The community interest that was worked out had certain size drainage areas or a certain probability flood where, when it was exceeded the Corps would come in and work.

Q: On a case like that, what's your guideline on making a decision on what the actual point will be? I mean, is it a political policy decision?

A: Actually, it was primarily a political thing. We tried different criteria, and Jack would go over to OMB and talk to them about it and say, "Well, if we use this criteria, here is about the way it will be." That we'll end up with saying anything bigger than, smaller than one square mile, why the government will never get involved with it. Or two square miles or something.

How many projects will that eliminate, how many projects would that keep the government out of, probably looked back over the ones that the Corps had worked on and stuff like that. They looked back and said, "Well, we would have eliminated all these projects here if we would have applied this criteria." OMB would say, "Well, that's good. Let's use that because we want to eliminate those kinds of projects. "

They decided themselves (OMB) what was a reasonable, but they didn't want to come right out and say that. They didn't want to come out and say exact size of area or something like that because that would have been too arbitrary. They wanted to come up with some sort of a technical way of doing it. You're doing the same thing, it's just that you come up with some combination of probability of run-off and various things for different sizes. It makes it look more scientific, but hell, it's not really any more scientific than just doing it arbitrarily.

Q: So you were fitting some criteria to a political decision.

A: Right.

Q: What they felt was comfortable.

A: Made them feel better. It's the same way with dam safety. Gianelli was trying to find ways to turn down doing dam safety. He was looking at risk analysis as his savior so he would not need to spend any money on dam safety. He even promoted some conferences and stuff to get people to come up with ways to analyze projects so that he wouldn't have to--so they would still look good.

He didn't want to do, just like we were talking, make a political decision, "I'm not going to spend any money on that project. " Just say, "Well, we're analyzing it and we'll keep analyzing it until we can come up with a way that says we don't need to fix it. "

Water Resources: Hydraulics and Hydrology

Q: So it's just expediency more than anything else. It's an easy way to get that political decision ratified. Then you get a yard stick by which you can gauge all the other ones you don't want to have authorized.

A: That's a way of getting people off your back. Just say, "I didn't just do this arbitrarily, like you might think I did. I did but it doesn't look that way. "

Q: All these good scientific principles.

A: It's kind of foolish to go through all that process, but I guess it's one way of getting people off your back.

Q: One of the things the Corps has never really gotten involved with on large scales is urban water supply.

A: Oh, no, they haven't done much of that. As I was mentioning before, I wrote my master's thesis on water supply. I was trying to figure out ways where the Federal Government could become more involved and pointed out all the different constraints on Federal participation in water supply. What the rules were for including it in reservoirs.

There was no way that the Corps really could get involved in a lot of these interbasin transfers and things like that because of water rights for one thing. One of the things they didn't really get involved with was conveyance facilities. They could come up with water supply in a reservoir, given that they had some party that was willing to say that they needed it for future water supply and were willing to make payments for it.

But some of that storage put in for future water supply probably never will be used for water supply because the people didn't have to start making payments on it for 10 years after they said they needed it. Then after the 10 years were up, if they didn't start making payments, then it no longer was reserved for water supply. If they started making their payments, then they could maintain their ownership of that storage. But a lot of them who asked for it for awhile probably would never actually take it. They just said, we're going to need it. Then, in case they did need it, they could hang on to it.

But as far as going out and doing single water supply reservoirs, I don't think the Corps has ever built--well, maybe I should take that back, there may be a case a two where they've built single-purpose water supply reservoirs, but they have to be darn few and far between.

Q: Single-purpose is very limited in the Corps now.

A: Well, even years ago. I think there was one in North Dakota they built primarily for water supply.

Q: For those small towns.

A: Yes, for those small towns. But there were some projects built many years ago for special purposes. I think they built some in those days when they had the--what do they call them, the CCC [Civilian Conservation Corps] or something.

Q: The Corps wouldn't have done something like that as much as the WPA[**Works** Progress, later Work Projects, Administration] or PWA [Public Works Administration].

A: Yes, Public Works Administration, or something like that where they were trying to **find** work for people.

Q: There was a lot of stuff like that at that time because, of course, the main criteria there was to get people to work.

A: Well, I think the Corps did some of those projects with that kind of authority. ..

Q: There were a lot of them.

A: We'll do the design work and all that and then these people will have a job. Well, actually, I think, Fort Peck was really a WPA project in a sense. It really worked as far as Fort Peck was concerned. They had 30,000 people there at one time working. So it was a pretty good at providing work.

Q: Bonneville Lock and Dam was in the same category, and you've got a little airport [National Airport] sitting down on the Potomac River that's in the same group.

A. Is that right?

Q: Oh yes.

A: It's pretty hard to look at some of those projects and understand how come they could build this thing in the first place when you compare it to some of the conventional ones.

Office, Chief of Engineers

Q: Let's go back to when you went to OCE from the field, what were the reasons for your leaving Garrison District or Omaha District or whatever it was?

A: Well, I was in Garrison District at the time. I was in the early days of my career, and I was looking for opportunities for an advancement, like you're always looking for. The reason I went to Washington, I had an offer from San Francisco District to go down there and work. I was seriously thinking about that, but I ended up turning that one down. When I saw this offer for Washington, I thought, I would give it a try. I sent in an application.

Shortly after I sent my application in, I got a call from Al **Cochran**, and he talked to me for quite a while about coming out there and working for him. But fortunately, I had had some good experience. Even though I hadn't worked very long for the Corps, I'd worked in several different areas in hydrology. I worked in Fort Peck for about a year.

I got involved in small flood control projects they were doing, like I mentioned on the Sun River. When I went to Garrison, I got reservoir regulation water control management experience in the hydrology section, plus some more hydrology work. Then I went to work in the planning reports section and spent a year or so in there. Then I went to work in the hydraulic design section where I was working on some of the hydropower work and the hydraulic design of surge tanks and things like that. So I got quite a bit of different experience in the area of hydrology and hydraulics in a short time. So, Al apparently thought that that was good for him in a review status where I was going to be working on reviewing other projects. Then I had worked for the Bureau of Reclamation, too, so I did have pretty good background as far as working on different things. It's a whole lot different then if you maybe had five years experience in one area. So when I went into OCE, I had been exposed to most all the types of studies that they did in there.

The people, of course, in the Garrison District said I was crazy to move back out east where there are so many people. You wouldn't even have room to park your car or be able to **find** a place to live. But I never regretted it. I think it was a good move. I knew I couldn't stay in Garrison much longer anyway because it was getting to the point where

it was winding down and it was pretty apparent that people were going to have to leave there. I felt strongly that it would be much better if I left on my own choice than for them to tell me where I was going to go.

Q: That's always true, isn't it?

A: It usually turns out better that way.

Geostationary Orbiting Environmental Satellite (GOES)

Q: Let me ask you a question about the impact on new technology. We talked a little bit about computers and how much they affected what the hydrologist does. How about things like remote sensing and satellites that came in in the **60's** and **70's**?

A: Well, I think the hydrology and hydraulics type people were one of the early users of remote sensing. One of the areas that got some of the early work in that endeavor was New England Division and their water control management activities using satellite relay for transmitting ground data from sensors, such as temperature and water levels and **rainfall** and things like that were transmitted to the division water control center which made operating decisions. Well, they had fixed operating procedures but knowing what is happening, why then they can make the proper moves in terms of gate openings and that sort of thing.

But, I'm trying to remember right off hand. There were different satellites that were being used, GOES was the more versatile satellite. But, I was trying to think of the name of the earlier satellite they were using that was fixed in its orbit so that they had to get their data at certain times because the orbit of the satellite was fixed so that it didn't vary too much.

Q: It wouldn't move you mean, it was just permanent.

A: Whereas GOES had a different track type thing, and it was easier to pick up **information** from it. Anyway, there were two or three of those satellites so that with the GOES satellites you could get information almost any time. There was one in position so that you could use them almost all the time. But, information would go up to the satellite and be rebounded to a mechanism in the water--well, what they were doing at first in some places was going to the--I'm trying to remember this stuff, it's been awhile since--but it went to another agency, the space agency.

Q: NASA [National Aeronautics and Space Administration]?

A: NASA. They got the information they had to convert it so that it would come up on the computer in the proper format and all that. But, finally, the Corps got their own satellite receiving stations. We started getting some of our own wherever we had water control centers.

The Lower Mississippi Valley Division had their own receiving station, and they had that big antennae on top of the division office, a directional antennae so they could receive the information. They had the equipment to transfer the information into a usable format. But they were one of the first ones that had their own besides the New England Division.

But they were pretty expensive to begin with. Each one of those stations were very expensive. As time went on, they became less and less expensive. In some cases, there were a few agencies that were sharing a downlink, what they called the downlink, where they got all this information. It's great for all kinds of information. For example, in dam safety, you can put sensors on dams so that if there's any movement to the dam it could be relayed through a satellite back to a central point.

They can keep track of a gauge so if there's any movement at all, why they'll notice it. Not only do they have the information at the station, they can put some sort of a threshold device on it so that if there's a movement over a certain amount it'll ring bells or set off alarms or something so that somebody will immediately notice it. They're not probably paying any attention to it. They're not going to just sit there and look at it all the time. So that something like that you almost need an alert device.

Whereas things like rainfall and temperature like that, why they go in and take the recording off every so often, especially if they know about a storm in a particular vicinity, why they're right there getting all the information. From the rainfall, they have runoff models for watersheds, knowing the rainfall and putting that rainfall into their runoff models, then they can predict how much of a flood is going to come down particular rivers and what their water surface might be in an urban area, that sort of thing.

Q: So it makes it a lot easier to conduct flood fights?

A: Oh yes. It gives you a better chance to operate your projects more efficiently so that you'll know what's coming and what's on the ground. You know what rain is on the ground.

Q: So that all feeds into the reservoir management that you talked about before.

A: From all that data, then they can do a real good job. It's really the Weather Service's job to alert people as far as potential flooding and all that, but a lot of the information they get from the Corps of Engineers and from the Geological Survey.

But the Corps was one of the first agencies to have satellite-type data information. We got involved in it more, spent more money on it than anybody else too, probably at the very beginning. Then pretty soon, all the agencies started getting into it. Some of the agencies would go together and have a downlink or a common downlink where they'd all get data.

One of the big advantages to the Corps of Engineers and to the Weather Service was that in some of our offices we were co-located in the same building. We had a water control center and the Weather Service office in the same building, with one on one floor and another on another floor. So they had ready access to each other's information all the time.

The Weather Service could come down in the North Pacific Division [Portland, Oregon], in the customs building there. The Weather Service could come and find out what kind of reservoir regulation changes our people were making whenever they changed the releases from our reservoir or Weather Service would know about it right away. Well, I'm sure they still have all these things.

But they had a briefing room where everyday, sometimes during a flood emergency, more than once a day, the Weather Service and the Corps would all get together in the briefing room and they would be hooked up with the district offices so that the district offices could report information in. They had computer hookups so that they could show things on a screen computer on each of the district offices and in the division. They could share information by computers and so forth.

But it was a real great asset to be able to have all this information in one place and to be able to make decisions much better and get information. The Weather Service could get information to the general public much quicker and with a much more accurate forecast than they might have if had to do otherwise.

Modeling and Predictions

Q: That kind of data then was all used in your modeling and all your predictions, and things like that?

A: Right. The Weather Service--then there are a lot of different agencies that got involved in developing watershed models, runoff models. The GS developed a lot of them, and the Weather Service developed their own. Each agency kind of wanted them for special purposes. So they designed them to fit their own needs most.

But, actually, I guess the ones that the Weather Service developed were the ones that were used the most in times of forecasting floods for various major points, like in the major cities like Kansas City, New Orleans, St. Louis, and all those places where big floods took place.

There weren't too many places where they had that kind of a connection, but there were a few of them anyway. Like, I think, Fort Worth, the Weather Service and the Corps were in the same building, too. Missouri River Division, they weren't in the same building.

Q: The Omaha District might have been though?

A: I don't know.

Q: The District was in the Federal building downtown.

A: The Omaha District might have been, but the Division wasn't.

Q: Yes, they were way out west.

A: Anyway, wherever they could they tried to get as close to each other as they could so they could share information. They would make dual forecasts. They would make forecasts, and the Corps would make forecasts and they would compare them and see why they were different and try to come up with the best answer.

That was in terms of primarily the rainfall. But in the western part of the country, they had the snow runoff forecast made every year. The Soil Conservation Service got involved in that quite a bit as the Weather Service. There were a lot of the big river basins out there where they had to make those long-range forecasts, so they had reservoirs with dual-purposes, storage served for irrigation and for flood control. So you would draw it down in the fall and the late winter to make room for the flood.

You'd forecast how much runoff you're going to expect to get before the beginning of the irrigation season. If you were doing a good job you would draw down far enough so you could, when the irrigation season started, you'd be right at the top of the joint pool.

If you missed it, you wouldn't be full. You wouldn't have enough water for irrigation. If you didn't draw it down far enough, then you might not be able to control the flood. So it was kind of a balancing thing there. You tried to avoid missing it too far either way.

Q: Now that's where all these statistics that are gathered allow you to model that more closely. So your margin of error would be a heck of a lot less now than it was, say 30 years ago.

A: Yes, it seems like the problem is you run into a unique situation that you never had before. Like, I was trying to remember what, what year was it, '82 or something like that, that they had a big flood on the Colorado. But, anyway, they run into a situation then where they got a real heavy snow late in the spring where the temperatures got real hot right after this heavy snow. There was no way of forecasting this.

Q: Okay, on the Colorado River.

A: Well, anyway, what happened that year, they had gone through the spring without a terrible lot of runoff. They weren't expecting a whole lot of runoff, so they didn't have much storage left in the joint use storage. Along comes this big snowstorm late in the spring and then high temperatures right after the snowstorm when all this snow melted real quickly and ran off. They had a big flood.

There was no previous incidence like that, as severe as that, that they could use. Whenever you make up your rules for operating, you look back over the historical records, and you try to devise rules that will handle all those previous situations. But, usually, you run into ones like this unique situation as very difficult to handle because when it happens that late in the spring, you don't have much room to fool around with there. You're getting close to the irrigation season, and you can't keep the pool way down.

So when you get a late storm like that, you're in bad shape. You just don't have the storage available to take care of the flood. So you're bound to have some damage from those kind of floods. There's just no way you can do anything about it. They had a lot of controversy and argument and so forth about the people that had the reservoirs out

there, the Corps, the State of California, and the Bureau of Reclamation, about not operating the reservoirs properly. But there really wasn't much they could do about it. They probably did about as good as could have been done under the circumstances.

But after it, they had to review all of their operating procedures and get all the people together and argue about what could they do or could have done to make it less damaging than it was. I don't know that too much came about in terms of changes. Just one of those things you can't handle.

Q: Well, isn't part of the problem about historical information, historical data. But you've only been collecting for what, approximately a hundred years or so?

A: Well, if you've got a hundred years, you're really in good shape

Q: Yes, in most cases in most areas in this country, you probably don't have anywhere near that. So you're operating with a very small database. It's like your 100-year floods and 500-year floods.

A: Well, you see that would have been one of the problems in the statistical analysis of trying to determine what the 100-year flood is and so forth, because you don't have enough data. The sample that you have is not likely to represent what an infinite length of record would represent.

Of course, even if you had an infinite, you'd still have trouble predicting what is going to happen in the next hundred years. Because what you get for the next hundred years, you don't know which part of that infinite record you're going to get in the next hundred years. So even if you did have a perfect infinite record to go by, why you still wouldn't be able to tell people what is going to happen in the next hundred years.

Q: You may get your hundred year flood tomorrow. You may get nothing too.

A: You may get two to three years in a row or twice in the same year even, maybe. Then get nothing for a long time. Now, you get three or four temperatures over a hundred degrees in the one day after another and then not have a hundred degrees for several years.

Q: That's the wonderful thing about nature, isn't it? It's totally unpredictable.

A: You can become pretty good at guessing at what is going to happen, but sooner or later mother nature will throw you a curve ball or something so that you can't be sure what you're doing.

Q: But in the years that you spent in hydrology, it must have changed markedly.

A: Oh, it changed drastically. As far as forecasting, watershed runoff has really gotten into a much better science. Before they had some rules of thumb they went by, and that's about all they had in my early days in hydrology. At one time they built an electronic model for one of the rivers, I think it was the Kansas River.

In MRD they had an actual gadget, electric model. It was hooked up so that you'd input data into this thing and with this electric model, why you could forecast the runoff, but based on input as far as rainfall and river stations. But they were put in electrically--I'm not even sure just exactly how it worked now, but I know that I went out and watched it one time. They gave a demonstration on it. But it was probably the closest thing, at that time, they had to modeling the watershed. But it was a pretty crude device.

But that it was called an analog model I think. Pretty crude by today's comparison where you have fancy computers and you can do all kinds of things. The grand benefit of computers is you can do "what if," what's happened, how much rain has taken place up to the moment, and how much has fallen on the watershed.

So you can model that, you know pretty much what's going to happen in the next day or two now that you had that much rain. Is it going to continue to rain? If it does, what is that going to do to your forecast? If it quits raining, what's the forecast going to be? So you can start looking at what might the range of flood sizes be, depending on if it rains so much, why it's going to be three feet higher and that sort of thing.

But even though you have fairly sophisticated equipment for forecasting, it's difficult to get information to the people that are impacted by it so that they will really understand what you mean when you say that it's going to be. For example, a gauge at Washington, DC, if you put in the paper there's going to be a 100,000 cfs [flood] coming down the river, it will crest at that gauge tomorrow at noon, what does that mean to the guy living along the river? He has no idea what that means in terms of how many feet of water is going to be in his front room or that sort of thing.

So, really, the only measure they have is by comparison. If a person asks, "Well, how much higher is that than the flood that happened three years ago. Because I know how

high the water got in my house three years ago. If you can tell me if it's going to be higher or lower than that, then I have some reference. " So if he says, "Well, if the forecast says the water is going to be three feet higher at this particular location than it was in 1986," for example, and that person knows how high it was, then why he can know what to expect. Otherwise, he just doesn't know what to look for.

So when you're trying to get information to the people that are being impacted, you need to have some sort of references for them to work with. Just doesn't do any good to tell them we're going to have a flood.

Q: I can see what you mean. They're not going to know at all what that means.

A: "Yes, well, so it's a flood, but am I going to be impacted?" That's the big question. It's hard to tell sometimes, too, because it depends on what their relationship is to the gauges where you're making the forecast. But, anyway, it helps a lot if they keep in mind particular floods in the past and how high they got, then they have a much better chance of knowing what can happen to them in the future.

Q: So you and the Weather Service--well, the Weather Service--will make the statements--it will be so many more feet and or something like that.

A: Well, and now they have better information, too, because of the flood insurance program. Most of the flood prone communities in the country are in the flood insurance program. So there is **information** on flooding in communities. People can, if they will make use of that information, they can get these, what they call **FIRMs**, flood insurance rate maps.

They show the floodplain, and they also have flood profiles and that sort of thing for the 10, **50-year** and a **100-year** floods. Even the **500-year** floods so that if they're near a stream and they know the river mile and the stream that they're near, they can get a pretty good idea of how high the water is going to be in that particular location. So there's a lot better chance of finding out what is going to happen to you now than there used to be even though the Corps or the Weather Service could tell somebody there was going to be a flood of 50,000 cfs or whatever.

They didn't have much of any way of answering a guy when he said how is it going to be in my house. So because they haven't done any water surface profiles in that area. In most areas, they hadn't performed water surface profiles. But now most communities have such things, which makes it a whole lot handier. Of course, this information is constantly being updated and improved.

The Flood Insurance Administration in getting their program, they did a lot of quickie studies where they didn't have as good of accuracy as they would have liked to have had. But they just didn't have the money or the time to do it in great detail, so they did all their preliminary studies and a lot of those are being, have been revised now and they're getting better information.

Not only that, but people who want to develop the floodplain, if they think that the water surface isn't right, they'll go in there and study it and come up with better answers and submit it to FEMA.

FEMA will review it and if they agree that it's a better answer than they have mapped, why they'll remap it. That's a lot of the work that we do at Dewberry & Davis -- remapping areas, redoing the computations and making sure that the new data is really better than the previous data. Because if it isn't better, why there is no sense in spending all that money to remap the floodplains. So if it's pretty close to what it was before, they don't remap it. But if there is a significant difference, why they will make a change.

The Environmental Protection Agency (EPA)

Q: Let me ask you about the impact of the environmental movement in the late 60's and the early 70's. Did that have any influence on what your hydrologists did or what you did in the Corps?

A: Well, of course, the Corps got involved in--and actually they were the ones that carried out the EPA rules and regulations. The people would come to the Corps to get a permit to do things and then whenever they would build anything in the floodplain or in a stream, wherever a stream was, if they put any fill in the wetlands, they had to get a permit from the Corps. The Corps was primarily carrying out the mandate of the EPA. EPA didn't have the mechanism to handle all these permits and stuff like that.

So EPA were trying to set up the guidance and get the Corps to enforce it, [trying to] keep people from building certain things and using up the wetlands. There have been a lot of rules and regulations and laws passed on just what you can do in terms of building in wetlands. If you do build, you have to compensate by providing other wetlands.

If for some reason you needed to build, or it was very important to build some sort of a development in the floodplain, those people that developed that, in order to get a permit to do it, they have to provide mitigation measures of some sort that are equal or better than what they've damaged by building in that area. Some times that is pretty hard to do.

There's no such thing as actually equal mitigation because the plant life or the animal and the fish life that you disrupted may not be duplicated. You may not be able to actually duplicate it, but you may be able to put some other type of fish or plant back in service in an area that didn't have it before to mitigate.

Q: But your work in hydrology would have been relatively unchanged by, I mean, you would have been doing the same things?

A: Well, hydrology, of course, got involved in where the wetlands were and what constitutes wetlands, where are they and how much water is needed to create a wetland.

Q: Oh, so you were right in the middle of it?

A: Well, trying to decide where on the rivers is the normal ordinary high waterline, for example. Along the river, how do you go about determining where the ordinary high waterline is? Everything below the ordinary high waterline, it really belongs to nature. Once you establish the **ordinary** high waterline, anything below that is not really a wetland because that's the predominant level of the water.

There are different methods of how you determine that ordinary high water level. One of them I call a physical fact method, where you go out in a boat up and down the river and take photographs and then examine changes in vegetation along the bank. You can almost tell by observation where the vegetation changes, that is--lower vegetation has more water supply than the upper part. That is a pretty good way of determining what the ordinary high waterline is.

Then you can establish by hydraulic computations what flow it takes to get up to that profile at that particular water or line on the bank. Then you can analyze that flow and say, "Well, what is the frequency in that flow." You can also carry that same flow onto other streams where you may not have as good of vegetation line to tell you what is happening. So that there is a lot of hydrology and hydraulics involved in deciding what are wetlands and what are not wetlands.

Then there was, of course, a big hassle in the beginning between the Corps and the EPA because, well, it wasn't EPA at that time, the Water Pollution Control Administration, I think. But, anyway, the earlier studies on environmental impacts where the Corps wasn't as enthusiastic as the environmental people were about being hard-nosed. The Corps thought the environmental people were being too demanding.

They kind of dragged their feet in a lot of areas, not wanting to go as far as the environmentalists wanted to go. So there was a constant give and take between the Corps and the environmentalists about how far should you go to keep people out of the wetlands. How much they needed to provide to take care of the damage that they had caused. But it took a lot of negotiating and so forth to get all those things ironed out so that everybody agreed on what were correct requirements.

Q: Wetlands are still a major point of confrontation, I think, in the environmental area.

A: Oh, yes. Everything you do almost has some adverse impact on the wetland. You build a highway, a railroad, or a city or develop--especially if you do any kind of water resources development, why build dams and levees and that sort of thing, they're all in the wetland.

Q: That's why the Corps is such a favorite of the environmentalists.

A: The Corps has problems of their own, taking care of their own environmental problems. EPA would be after the Corps to do more than they had done and mitigate obviously in most cases, the Corps would say, "Well, this is enough. " EPA would say, "Hey, haven't even begun to provide what you should. " So they'd have to do some more negotiating and **finally** come up with something that would satisfy both of them.

Q: Weren't there various contending factors within the Corps itself on these issues? I mean there was a lot of internal strife on these environmental questions.

A: It tends to go along with professional biases. When you get biologists and zoologists and people that deal with fish and wildlife and all that type of thing, why they're obviously going to be much more interested in preserving whatever we have. If you're a structural engineer and you want to build structures, you're not so interested whether some little obscure fish is going to be endangered or not. So, I think also, major structural works have been held up for years because of some minor endangered species.

Q: Or completely lost in some cases.

A: Some of the projects, they were never built. In some cases, why, of course, the people that were fighting for the preservation of that endangered species thought it was pretty

important. But other people probably had a hard time being convinced that it was that important. But should [we] give up something like a major hydropower dam because of some little fish or something like that that nobody had ever heard of before.

The sad part of it is, I think, whenever they're going to build something like that, immediately all the environmentalists assemble on the spot and start looking for everything they **find** there that might be put out of existence because of the project. Not only that, you not only have problems with fish and wildlife, but you have archeology interests who get in there and there's a burial ground for a famous Indian tribe that went out of existence 2,000 years ago or something, and they need to find those lost buried Indians.

There have been some pretty famous finds like that that held up construction of projects. While they had to go in and remove all remains and identify them all. They weren't sure they had them all, so they kept holding up production.

Q: If I'm not mistaken, the Corps has in its possession, in various places, more various remains and pottery shards and everything else than about anybody in the world. Can't get rid of the stuff anymore either.

A: It's probably true. Whenever they build a project, that's one of the first things they do is go out and start digging for artifacts and seeing what they can find. They open it up for all these people that want to come in and do their digging. If they think there is something there, why they want to be sure and get it. Well, not only that, but when they go into construction and they start digging up the foundation for a major dam, they sometimes run into some artifacts or something, a real important find. They'll hold up construction while the archaeologists come in there and clean out the sight and get all the good things out of there.

Q: And then try to figure out what they all mean.

A: Where they come from and what each little thing means. But back in the early days when they were building big dams, there was a lot of controversy. You'd see big articles in *LIFE* magazine and other places about major projects and how much trouble they had getting them built and how many people objected to them.

Q: Well, that should all calm down, shouldn't it now, because there just aren't that many big places **left** to build big dams?

A: Well, they won't be building anymore big dams. Huge ones anyway. But most of the major sites have already been used up anyway. But that used to be one of the big bones of contention in designing the project sites. Here were the economists and some of the planners saying, "Well, we've got to optimize the benefits of this site. We've got to get the most benefits for the buck here" and all that kind of stuff. Analyzing the project.

Well, when they were doing this they might have one of the most rare dam sites in the country. It was impossible to find another one like it. Do you want to go in there and optimize that thing on present day conditions or do you want to build that thing to take full advantage of the available site there? Get all of the storage you can get while you're building it there or do you want to narrow your project down to just the size you can economically justify on the present conditions or something like that.

So sizing projects became quite controversial. People argue, "Why spend money today that you don't have to." But the problem is if you don't take full advantage of a site when you build it, the chances are you never will. **You'll** probably never go back and rebuild the thing. Although because of dam safety, there have been a number of projects that have had some major changes to them. Not only that but since they made it possible for a private interest to put in hydropower development in Federal projects, there have been quite a few add-ons to Corps and other Federal projects to provide hydropower facilities--take advantage of the dam site and add hydropower. They get a license.

Well, one company, I forgot what the name of it was, but they went out and they grabbed up a whole bunch of the Federal projects right away when it first became possible to do that. But then they had a limited amount of time before they had to start developing or they lost their permit. So after a certain amount of time why they didn't have the resources or the potential for using up all those sites. So they just used the ones that were most lucrative.

But there's been quite a few put in. That's a major problem, too, how do you put in a new hydropower facility with a dam that wasn't designed for it--retrofit an existing dam or hydropower. How do you use the flood control tunnels and if you do, are you reducing the flood control capability of that project or are you compromising the other project benefits by adding that hydropower on there. All those things have to be ironed out. The Corps has to improve the structural soundness and all that type of stuff before they'll allow [anything to be done].

Hydropower

Q: So there are a lot of very complex factors that would go into some of those things.

A: It was really difficult for a while there. Gianelli was in the Assistant Secretary's office at the time when that first got started. We were doing a lot of negotiating with people in hydropower and trying to decide which projects they'd be willing to put hydropower, future hydropower, too. Somebody would want to lay claim for future hydropower and get the Corps to put in the minimum facilities to begin with when they were building the projects so that eventually the hydropower could be added later on.

They were willing to pay a certain part of the cost of doing that because they had the permit to put in the hydropower and they could do it at a later time. But there's a lot of cost savings if they could do it right at the time the original structure was being built rather than wait until afterwards and have to put it in. So the question became then, "Well, how much money are you going to charge them for doing that and under what circumstances will you do it?" The hydropower wasn't authorized as a part of the Federal project.

So then when you go about building a project, somebody has to pay for that extra design effort and all the extra construction and all that sort of thing. Is the Federal government willing to do that and accept payment later or do they want their money today? All those kinds of questions had to be resolved.

So there was a lot of negotiating, and Gianelli got involved in a lot of that himself. His lieutenants would go out to our district offices and sit in negotiations themselves rather than entrust it all to the Corps. They wanted to have the hands in a lot of these things and didn't want to be caught unaware of what might be happening. So they wanted to be sure they knew exactly what was happening on every project. But the only way they could keep track of it was go and participate in the negotiation.

Q: Now that has to be a pretty good size gamble by a company to throw all that money up front if they wanted to do that. So what was the resolution of that. Was it on a case by case basis?

A: Well, I can't remember off hand exactly what the conclusions were, but in most cases they didn't have to put up all the money right up front. They would be expected to repay the cost in a certain time, and they'd have to start developing. The Federal Power Commission had their rules set up so that you would get a permit and that's good for so

long and then by the time that permit expires, you have to have started your design and [be] proceeding on to actually construct it.

By the end of that permit if you haven't done certain things, why then you can't keep your permit. It goes up for grabs for somebody else. Even the projects that have permits, they're only good for 50 years. There are a lot of these old Federal Power Commission permits that were issued 50 years ago. They're coming up nowadays for renewal. Just because you built the dam in the first place, doesn't mean you're going to get a renewal of your permit. The Federal Power Commission can give that project to somebody else if they want to. Not likely to, but they could.

Office of Research and Development (ORD)

Q: **Let** me change a little bit and ask you something about the establishment of the Office of Research and Development in the Corps. That's a relative newcomer. How did that affect the work that you were doing, especially the work you may have done with the Hydraulic Engineering Center?

A: Well, it became another layer, another management layer. Of course, the whole idea was to more efficiently manage the labs, the Corps labs, to have this office in the headquarters so that they could keep somebody who was spending full-time keeping track of all this stuff and trying to decide where the money should go and all that sort of thing.

But, by and large, there still was an awful lot of input --most of the input had to be done by the professionals who were most familiar with a particular type of research, like hydraulic design. Even though some of the people in the Office of Research and Development were a little bit familiar with what was going on, they didn't really know enough of the technical details to know whether certain types of research were worthwhile or not.

They had to depend on the monitors from each of the disciplines up in the Chief's office and from field offices. When they had these, they'd have R&D, oh what do they call them. Well, anyway, they'd have a--for various parts of the research effort--they'd have a get together each year and go over all the proposed research projects by the Hydraulics Lab, the Cold Regions Lab.

HEC would have an annual review and someone from the Office of Research and Development would be at that. HEC would, for example, lay out the program of all the kind of money they wanted and the projects they wanted to do. I would go to those

meetings, and we'd have people come in from the field offices, and we'd sit around and talk about each of these research projects. Some of them would be continuing projects, and you'd have to say, "Well, this project starts with a small amount of money this year and then next year we'll have a big amount of money. The following year we'll have a bigger amount of money and then it will start petering off."

You had to work up the long term, not just what was going to happen for the next year, and project out ahead. That was part of the things the Office of Research and Development did. They were **programming** this stuff into the future so that they would have some sense of dollar values. Just when they'd start a project, they wanted to be sure that they'd be able to carry that project through and not have to drop it half way through or something like that because of improper planning.

But anyway, a lot of time went into those programming conferences where they would get the people getting ready to make their presentations. Then they had one big programming conference in OCE where all the lab directors would come in and make their pitch before all the monitors in headquarters and the Office of Research and Development. They would all tell about all the good things they were going to do and the great results they were going to get from all these research projects.

If you didn't really know what they were going to do and what the prospects were for results, they could really give you a song and dance. You had to know your stuff or it would sound pretty good to you, even though it might not have been so great. So you had to know what was going on when you sat in those meetings and making your decisions. Hell, the whole group would work together and decide on which things were most important.

The problem was that even though you could find areas that seemed really important, who did you take money away from. Some new project would come in that everybody agreed that it was a great thing that we ought to be doing it, but who lost money to pay for that new project? Nobody wanted to lose money, they wanted to keep their own, their level up where it has been always. They were all trying to protect the amount of funds they had so it got to be quite a game there if you try to preserve your amount of money.

Q: So it would be like your people from hydrology would be fighting with the people from the structural side and the geotech people?

A: Everybody was in competition, yes. So, it was kind of hard--they served that **role** of kind of being the mediator or the ..

Q: "Honest **broker**"--is that what they were for?

A: Yes, "honest broker," or something like that because, obviously, I'm in the hydrology and hydraulics area and even though I may be sympathetic to these other things, I'm still going to be wanting to spend all the money, all that money I can on hydrology and hydraulics. Here's Chuck Corns over in structures, he wants to spend all the money on concrete research. So somehow you've got to get people who don't have a particular bias, who just are trying to look out for the general overall good. That was really kind of the role they served.

Q: Was that one of the reasons that underpinned their creation?

A: I'm sure one of the ideas behind it was to have people who didn't have a built-in bias. Because the way it was--each element had their own research representative, and they didn't spend **full-time** on that. That was just a part-time job for them. Then they would all get together, and then they would have to kind of bicker over who was going to get how much money until the **Office** of Research and Development come along.

They then got into some more serious planning ahead and that sort of thing--look at future years. Then they got into deciding what were your high priorities. You would set up your most high priorities and then your second high priorities and third high priorities, and they got into some pretty fancy stuff where, depending on the feedback they got from OMB as to how much money they were going to get, you may get to have your first three levels of priority or maybe only your first two levels of priority.

So each research group would have to set up a bunch of priorities. This research project may be a number one priority, this other one may be number two or three or four. Sometimes you would go as long as five priority, just in case you got more money, so you'd have something waiting in the wings to put on research, into the research program.

Q: Would you discuss at length with the people from Davis what their proposals were going to be so you'd have at least some idea of what you wanted listed as priorities when you went in?

A: They would suggest to headquarters what their priorities were, which ones were their top priorities. Also they would, of course, ask us [for] any of our ideas on what they ought to be researching. They would ask the field offices to submit research proposals. Each

year any of the field offices, if they had an idea on a research project, would submit it to whatever element of research was responsible for it.

If it happened to be an H&H topic, why they'd send it to us. Then we would review and decide if that was a good topic. If it was a good topic, what kind of priority should it have? How would it fit in with the others? Based on all these submittals and sometimes there were quite a few of them, that would help us decide on what the research program would be.

Somebody from a field office was having problems with it, and they needed to get it solved. They didn't have any way of getting it solved. So let's have a research project and figure out how to do this here and who should do it. Then, the subject might come in to H&H and then we would decide, "Well, does this belong in HEC or does it belong in the Waterways Experiment Station?"

So we would take the topic and send it out to the lab that we thought knew the most about it and could do the best job of it and tell them to submit a proposal on it telling us what they were going to do and how much they were going to spend and how long it was going to take it and what kind of results they expected to get. Then -we would look at it and decide whether it was a viable topic to put in the research program.

That's how a lot of the research projects came about. But a lot of them were brought about by the people from research themselves, who had a good handle on what things really needed to have more work done on them or new work done.

Q: Now were you able to maintain a fairly level amount of funding for research and development in hydrology while you were there or were there great fluctuations?

A: No, there wasn't a lot of fluctuation. As a matter of fact, it's kind of like a moving train. When you get moving, why it's pretty hard to stop it. I mean you get the program built up, and you're halfway through projects or three quarters of the way through projects, and you can't very well stop those research projects after you've spent three quarters of the money on them. You've got to keep going on them.

So you've kind of got several projects going that are part way through, and you've got new ones coming on and others dropping off so it's a continuing process like that. But there are new ones coming on, old ones falling off, and others in the middle.

Usually, historically, what you've received in the past is a guide as to whether you should have a similar level in the future or not--to have new things that need researching. Hardly

anybody was willing to admit they didn't have anything new that they should be funded or they would run out of money. But almost everybody would come up with something to research. As long as they had a program, they would try to maintain it, of course. Sometimes they would lose money and then go down and battle them for more.

But they'd still lose money because they had, in engineering, a group of the researchers that would all get together. They would try to decide from an engineering standpoint what were the most important things. Then there would be engineering versus planning. They would trade off to see which things needed the most research and argue about why theirs was more important than the other guy's. Usually, the most articulate guy was the one who won out.

Q: We've talked about this before.

A: If you're a good speaker, why you have a lot better chance than the other guy.

Q: So by and large, though, the creation of the Research and Development Office was a positive step, you think?

A: Oh, I think so. It gave you, as a research monitor or program manager or whatever, you have somebody to go to. You go to them and say, "Hey, we've got something new, and we'd like to get it done." They would then start carrying the ball. They'd say, "Well, we'll see, we'll start talking with people and see what we can do about doing something." Otherwise, you had a tough time on new things.

Or if you didn't like something, the way something was being done, you had somebody to talk to. You had somebody who would listen to both sides and then would try to mediate or do whatever needed to be done. For example, there was research going on in hydrology and hydraulics down in WES that wasn't being funded by the Corps, yet the people in WES were doing it. It was being funded by another element of the Army or even some other agency was paying WES to do it. Our experts down there, who were supposed to be reporting to us, were doing this without even telling us about it. It used to really aggravate me when I'd hear about some hydrology research going on in **WES**. I hadn't even been questioned about what they needed to do or how we could help them or anything like that.

Maybe I mentioned it to you before about the one time that I got called by Bob Clark from the Weather Service who asked me about this research conference going on in WES about

new techniques in hydrology. I said, "What are you talking about?" He says, "Well, your Waterways Experiment Station invited us down to a big meeting on new technology in hydrology." "I never heard anything about it." He says, "Well, everybody else knows about it but you I guess."

Here part of the U.S. Army Corps of Engineers doing research hadn't even contacted their own experts to invite them to this exercise they were going through, that they had gotten a bunch of money to do some battlefield type hydrology. They were looking for new ways to do hydrology. But they hadn't even bothered to talk to us about even coming to their meeting. It really irked the dickens out of me. When they would approach a subject like that without using their own Corps expertise.

Well, you find other things like that happening within an organization that has a lot of technical competence. I used to find occasionally a relocation group who were in the process of relocating highways or something. They would do all their own hydrology, all their own hydraulics. They would do their own bridges. They wouldn't even go to the structures people to ask for help on bridges and things like that. They'd do all their own stuff. Sometimes the things they were using were antiquated as hell, you know, that people weren't even using anymore. But they wouldn't go down the hall and ask somebody that knew what to do. They thought they had to do it all by themselves for some reason.

Q: They didn't want anybody else in their business?

A: I don't know, protecting their little turf or something. But rather than getting a good solid answer, they were willing to stumble along and do the best they could. It's terrible, in my estimation, to see things like that happen.

Q: But that's bureaucracy at work, isn't it?

A: Oh yes, it sure is.

The Directorate of Civil Works

Q: At it's worst as a matter of fact. How much did the Directorate of Civil Works change during your years there? Personnel, of **course**, changed.

A: There were pretty significant changes, I think, then how different elements kind of seemed to be rising to the top. At the beginning, when I first went [there], engineering was kind of a top element in the Corps as far as having stature and all that sort of thing. The Chief of Engineering was probably the top, was considered the top engineer in Civil Works.

Then Planning started emerging, and it was building up. Then Programs and Policy were all part of Planning when I first went there. Then pretty soon Programs broke off and had its own division. Policy broke off and had its own division. Then the first thing you know, why Policy is more important than Planning. Programs is another big element.

Bory Steinberg

Bory Steinberg, when he was in charge of Programs, he got it built up to where he was the right hand man for Gianelli in the Assistant Secretary's office. They talked to him first before they even talked to the Chief. So he had a lot of influence on what went on. I'm not saying what he did was wrong. What he was doing, he was doing a really good job. He's an excellent manager and very technically oriented and all that. But somehow Policy is the most important thing rather than Engineering or Planning. Policy is all of a sudden the thing. Well, he moved from Programs to Policy.

Q: There was a lot of switching going on there for awhile, wasn't there? In the late **70's** and early '80s General **Heiberg** as Director of Civil Works made a lot of switches?

A: There were quite a few switches, and then when they moved Engineering from Civil Works over to military construction [Engineering and Construction].

Lloyd Duscha

Q: When they created Engineering and Construction Directorate?

A: Engineering and Construction [Directorate], they took all of the engineering from Civil Works except Hydrology and Hydraulics. The reason they didn't take that was, I think, hopefully I had something to do with keeping them from breaking it all up. They wanted to split it all up and take hydraulic design over with. Lloyd Duscha wanted to take that over with him. Some people wanted to break up hydrology and give part of it to Operations and part of it to Planning, and anybody else that wanted some, why I guess

they could have had some. But, I think, I had persuaded General Wall that that wasn't the right thing to do.

I don't think General Heiberg [As Deputy Chief of Engineers, 1982-83] was too concerned about it, as he was willing to split it up. I tried to convince him that it wouldn't be a good thing to do. But I wasn't all that convincing, I don't think, as far as he was concerned. But General Wall seemed to agree that it should stay intact, and so he kind of negotiated with Lloyd Duscha about, "Well, Gianelli wants to keep that in Civil Works, so he's going to have some control over it. I'm willing to let Duscha have a lot of the say so in what these people do. Especially in the structural part of hydraulics." He said, "As far as the other works are concerned, they can serve you and me. We'll work it out so that we both get the full service out of H&H." They seemed to work it out pretty good.

Q: Well, that's all gone back now hasn't it.

A: It's gone. .. In the process, the Engineering Division of Civil Works, just lost out terribly. When Lloyd Duscha was in charge of Engineering Division in Civil Works, he was the top engineer in the whole Corps of Engineers as far as Civil Works, well, even as far as military engineering was concerned. He had the highest grade, I think, of any of the civilians. Then he moved over to the Engineering and Construction Division [Directorate] and took all that prestige with him, and he was the deputy over there.

What do they have when they come back? They didn't even have a Chief of Engineering. They've got an acting Chief. They still don't have a Chief of Engineering as far as I know. It's still been an acting job and a **GS-15** is running the Engineering Division in Civil Works now. The size of the Engineering Division has collapsed so that there is hardly anybody in it anymore. So it really took a beating in changing from one director to another. From being a preeminent organization to kind of a back seat organization.

Q: Now it's all the other ones that we talked about--Policy, Programs, Planning, and Operations.

A: Operations, well, and of course part of this took place because Operations was getting the bulk of the money. Back in the early days when I went into the Chief's office, most of the money was for construction. Operation and Maintenance was a small part of the budget compared to the Engineering and Construction.

But then Operations money started becoming more and more prevalent, and finally it was a much bigger part of the budget than Engineering and Construction. The Operations and

the Maintenance became a big item. So that division became very prominent because they tell people where they can spend their money. If you want any money, you got to go to them to get it. When you're passing out the money, you get to do a lot of dictating about how it's going to be used.

Q: That's always been the case, hasn't it?

A: Oh yes, whoever has got the bucks has got the authority too.

Q: We're talking about a lot of your colleagues in Civil Works. What about the relative impact of the various Directors of Civil Works that you worked for. You've mentioned John Wall. Are there any others who left their marks on the directorate?

A: Well, there were quite a few of them, I don't think, that really changed anything much. They may have made a lot of noise here and there but actually I think probably General Morris [Major General John W. Morris, Director, April 1972-September 1975, later Chief of Engineers] was the one that had a lot of influence on what went on when he was there. Heiberg, too, had a lot to do in Civil Works. Let me think of some of the others.

Major General Charles I. (Chuck) McGinnis

Q: How about Chuck McGinnis [Major General Charles I. McGinnis, Director, July 1977-June 1979]?

A: Yeah, McGinnis did a lot, too. I really liked him. You could talk to him and he would listen to you. A lot of times he would do something about what you mentioned to him. A lot of times about dam safety. ..

Major General Jackson Graham

Q: Much more important than were the senior civilians who provide the continuity in the directorate?

A: Well, all of the Directors of Civil Works had their pluses and minuses. I guess some of them seemed to work with a lot of the people and others seemed to work with just a few.

Like General Graham [Major General Jackson Graham, Director, March 1963-July 1966], he was one of the most personable Directors of Civil Works we ever had. I think he knew everybody, and he talked with everybody. I've never seen a guy who could remember things like him. You'd give him a presentation on something, and he could make the presentation on the same subject after just having heard it once and do a good job on it. He did that all the time.

Of course, he'd go to Congress and make presentations based on what he had heard from his staff. He had a phenomenal memory for being able to do things like that. I guess, all that paid off when he was working on the Metro Washington Metropolitan Area Transit Authority subway system].

Everybody liked him. I don't know anybody that ever had a harsh word about him. Even a lot of the families of the people that worked in Civil Works knew him. My wife got to know him real well on the bowling team. He was one of the worst bowlers in the league, and yet he would come down there every time and bowl and have a good time with everybody.

Q: Well, he's one of those old pre-World War II Engineer officers. I mean not much pre, but certainly pre.

A: Then you'd hear about all the great things he had done when he was out in the field. He was really a person who looked after details. He wasn't too good to go out into the worst conditions and find out what was going on. He'd make sure things were going right. If there was any inkling of something being wrong or needing improvement, he'd go out and look at it on the site, no matter where he had to go to look at it. When he was working on the Metro, he used to spend his weekends running up and down with a motorcycle. Which is dedication at its ultimate, I guess.

Major General Joseph K. Bratton

Q: That's true. Which one of the Directors most influenced the directorate during the years you were there? I imagine the years at the end of Heiberg's tour and the beginning of

Wall's when they made the big changes and reorganization under Joe **Bratton** was a major reshaping of the whole directorate.

A: Joe **Bratton** was one, I think, that was pushing for the engineering to be all one organization, not have an engineering, Civil Works, and engineering, military. He wanted it all in one.

Q: More like a division or a district structure?

A: Yes, he wasn't in favor of the two different engineering groups.

Q: Well, I know he told me one time that Gianelli got him very early on and said, "You guys are the Corps of Engineers, you don't even have a division of engineering as a major component of your headquarters. It's down in Civil Works." I guess from that point on he was looking for some way to. ..

A: But then when it come time to make the swap, Gianelli didn't want it all to go together.

Q: Well, he's a politician.

A: He was the one who didn't want to put it all together. He was arguing with **Bratton** that he should have it all together, and then when it came time to do it he was the one that was the fly in the ointment to keep it from being a full engineering division.

But one of the things that kind of happened, I think, was when they put it all together was that Civil Works kind of lost out on that, too, because the military had such a strong budget. There was so much going on in military work that there wasn't enough time hardly to look at Civil Works. .

Q: During that period of about the early '82 or '83 when Civil Works had no new starts and no budgets?

A: There was a lot of work going on. So the Chief's administrators in the engineering side of the house were spending **all** their time on military things so that you couldn't hardly get time to talk to them. They were so busy that there wasn't anything they could do about it. They just had to spend more time on military than they did on Civil Works. That was

a time when dam safety was really an important area and well, it's still important, it's always important.

But we were trying to get something done about it. Lloyd was very interested in it, but he was being forced to spend so much time on military stuff that he couldn't spend the time on it that he had previously. So, I think, dam safety kind of lost out in that area. Gianelli wasn't too concerned about it so that when you had the engineering people who were so busy they didn't have much time to look at it, why it just kind of lost some of the emphasis it probably should have had.

Q: We've talked about the military a little bit and we've talked about Lloyd and a number of the other civilian people, in your career? about Frank Snyder a little bit. We talked about Al **Cochran**, we talked about Gail Hathaway. We talked about Francis Slichter. Who else among the civilians, the key civilian positions, were really the driving forces in Civil Works while you were there?

A: Well, obviously Wendell Johnson was one.

Joe Tofani

Q: Oh, I forgot to mention Wendell Johnson.

A: Wendell was always one of the best. There was Tofani, of course.

Q: Yes, Joe Tofani.

A: Everybody knew Joe and his connections and his ability to speak; all that sort of thing. He was one of the prime movers, and he was able to motivate generals in the direction he wanted them to go. He wasn't bashful about letting them know what the right thing for them to do was. Somehow he was able to get away with it without getting them ticked off at him. But, I guess, he had so much influence over in Congress, the general wouldn't say anything to him anyway.

That's how he got his promotion, you know. He got a major promotion when Congress passed a law and promoted him above his Division Chief, which really screws up an organization.

Q: I'd say so.

A: I think the Chief of Planning was a **GS-16**, and they promoted him to a 17 or something like that.

Q: Tell me about that.

A: I forgot it's crazy things like that that really foul up what a general can do with his organization. He can't very well have Tofani working for somebody who is a lesser grade, so he has to give him his own division.

Q: I know Joe. I've talked to Joe a number of times and Joe lamented to me frequently about the lack of aggressiveness and lack of push in the civil servant today. He said "**We** would have never stood back and waited. We would have manipulated the situation."

A: He was great--well, the thing is he had so much, I think, backing over in Congress, some of the senators and representatives and so forth, that if some general would have taken off on him he would have probably gotten himself in a lot of trouble. He probably never would be Chief of Engineers if he had gotten on Joe Tofani. He was one of the few civilians that ever had that kind of power, I think, in all of Civil Works. I don't remember anybody that was that influential...

He just had the kind of a personality that he did get things done.

Q: And took a back seat to no one that I can tell.

A: He was quite a guy all right. Well, Wendell was a lot like that, too. He and Wendell were quite similar in being on top of the situation and always kind of being the lead, when they walked into the room they didn't wait for something to happen, they made things happen. They didn't wait for a general to ask them how to do something or what should come next. They'd start telling them what should come next.

And so anyway, there weren't too many people like that. I'm trying to think of somebody like that, perhaps Henry Weinkauff. I didn't really know him that well, but he was kind of an unusual type of guy. He was very concerned about his own professional image. If something went contrary, to make him look bad, he'd get all excited about it. He was always trying to present the top image no matter what the situation was. He seemed to be

more, to me, like he was more concerned about that than he was about getting the job done. Some of the others--you see people like that who seem to come first before the organization does.

Alex Shwaiko

Q: What about Alex Shwaiko?

A: Well, I knew Alex pretty good. I knew him about as well as any of those people. Well, what can I say about Alex. We'd go out in the field, we'd go to conferences out there. Onetime he came to the meeting, he wasn't prepared at all until he got into this meeting. He didn't have the foggiest idea of what we were going to be talking about.

He hadn't been briefed or anything. So he took an absence from the meeting. He was gone for a couple of hours while we were meeting and then he came back later, and he was right on top of everything. He kind of took over the meeting then.

But sometimes he just wasn't prepared, and I don't know whether he just hadn't had time to get his briefing or he had forgotten what the whole thing was all about. But once he got all of his notes together and remembered what the hell was going on, why then he was right on top of it. He would get things done. But it use to be puzzling to me how he could do that. But he had a lot of meetings, I'm sure, that he had to go to, and Alex did not like to delegate authority to others. He was quite the guy though.

Q: Well, now he was a person that moved from Programs to Policy or something, wasn't it?

A: Well, he was in charge of Planning.

Q: Planning to Policy.

A: If some of those jobs changed, I think they were just trying to make way for somebody else, they moved some people around so that they can get a person they want in there who has some special capability. So they move another guy. I think that's what happened to Alex.

Joe Auberg

Q: Well, he liked the Capitol Hill scene didn't he?

A: Oh yes. Well, I think that his primary activity was being over on the Hill and briefing Congressmen and senators all the time. He spent most of his time doing that I think. That's probably why he wasn't ready for some of those meetings because he was so busy off lobbying for one thing or another and trying to get projects. Now, he was one of others who did things like Joe Auberg--I know Joe Auberg worked for Alex. Joe would tell Congressmen how to get around the laws and stuff like that. Some Congressman would be wanting to do something and Joe would say, "Well, if you do this, you can get it through."

Q: You can make a lot of money on the Hill doing that kind of thing, can't you?

A: Well, he was just giving away his advice. Finally, I guess, the Assistant Secretary's office got so mad at him that they took him over in their office and then locked him in a room where he couldn't talk to anybody. But he was always conjuring up some project or how they could get it through. This was at a time when the President didn't want to spend any money. He was giving Congressmen ideas on how to get their projects.

Q: I can think they would lock him away.

A: There was Gianelli trying to figure out ways to stop spending. But anyway, Alex was kind of like that, too, in a way. He was there to help them in anyway he could. A lot of them really didn't know how to go about promoting their own projects, and he would help them.

Q: That really is one of the things that Gianelli and Dawson especially didn't like, wasn't it?

A: They didn't like that at all. They would have preferred not to have Civil Works people going over and talking to Congressmen. As a matter of fact, I think they picked people that they would let talk to Congressmen. They would call up the Director of Civil Works and say, "Well, obviously Bory Steinberg can talk to them and Alex can talk to them. But I don't want these other guys talking to them." They had their own people that they knew would be pretty cautious about what they said and so forth.

Augie Smet

Q: What about Augie Smet?

A: Oh, Augie and I went to Graduate School at Catholic University together. Went to school there at night for about five years to get a master's degree, and Augie and I had several classes together. But Augie was, he was a really hard working programmer. Well, let's see, I'm trying to remember, Bory worked for him. Augie was in charge of programming.

He was always a hard worker. He spent a lot of time with OMB, of course, as most of his work was with the OMB staffer in setting up the funding for years and arguing with those staffers as to how much money they could get for the various things and trying to educate them on how to do things and why they needed the money and all that sort of thing.

Things can get really confused over in OMB. I remember one time there was a budget for water quality. Water quality was new and, well, especially the Executive Branch of the government didn't want to spend a lot of money on water quality at the time. But we had a big budget for water control management, big budget, you know, because there was all this satellite stuff and gauges all over the country and a lot of people working in it.

So we had a staffer over in OMB who was looking over our budget, and he didn't know the difference between water quality and water control. He thought water control was part of water quality. Well, they're somewhat related. What you do in water control has something to do with water quality. But water quality is a sub-part of water control, not the other way around.

But, anyway, he thought it was all water quality. He cut the budget by 80 percent or something like that. Just really wiped it out. After they sent in the budget, why he "X'd" that out and put down about 20 percent of what they had asked for. We had a hell of a time with him trying to explain to him what the difference was and why all these things were necessary.

We took him out to the field offices and showed him around to two or three of the water control centers and explained to him exactly what each person did and how water quality was just a small part of the overall--so you could cut out all of the water quality money and you wouldn't have much of an impact on the water control budget. But when you start cutting out the water control budget, you don't have anybody left that knows how to operate the reservoirs.

How are you going to operate the reservoirs if you don't have people who know what the hell they're doing? How are you going to get your data if you don't have money? Well, we finally got him educated, and he put the money back in.

But those were some trying times when you get people that were so new to the water resources area that they couldn't understand simple things like that until they had been thoroughly educated. Some of those were trying experiences that Augie had to really work hard getting us and them together and getting all this stuff straightened out so that you didn't lose a lot of money when you really needed it for some essentials. It wasn't some add on, you know, that they thought we were just going overboard on water problems.

Q: **Yes**, you get a lot of that.

A: Anyway, Augie had a tough job, I think. When the Administration is always trying to keep costs down and he was trying to keep the programs going and convincing the staffers. Then once he gets them convinced to get their bosses convinced and so forth.

Q: Especially, I guess, when they're politically motivated like some of the Reagan Administration people must have been.

A: Well, they're always trying to make a name for themselves--some of those upper echelon people at OMB. They're close to the President, and they might get something big, appointed to one of the agencies, agency heads, or something.

Q: Become a more important person.

A: Well, when Carter was in, it was a weird time. We had all these young people heading up major offices that really didn't know doodle about anything. The first job for some of them. They came in as an Assistant Secretary of an agency and 30 years old and never even had a job before. They were suppose to be managing Federal programs.

Committees and Jake Douma

Q: After the end of the last session, we got into a discussion of committees. I thought that was a very interesting discussion where you explained why a committee would be used and

how a person like Jake Douma used the committee. Would you like to go back and discuss that again and how technical experts like yourself saw those committees assisting your work?

A: Well, it kind of took the place of the normal engineering manuals, which take a long time to evolve and finally get written. Not only does it take a lot of money to get all the expertise you need to put together a manual, it just seems like it takes forever to complete the dam things. One of the ways, especially the hydraulics people, got around that slow, burdensome job of getting a manual written was to set up these technical **committees**, like channel stabilization and some others, too.

They got together the people that they knew in the field offices that had good expertise in the area, and they'd get them assigned to the committees. Then, before they met, they would send out a notice to district offices about when they were going to meet and ask for subjects and information on problems in that particular area. Then people would be invited if they had a problem, even though they weren't a member of the committee. They could come and make a presentation on one of their problems.

The committee would then review what the problem was and make comments on it. They may do some extended study on it and actually come up with some documented solutions to the problem so that the committee notes then formed a basis for technical documents for use by the different districts even though they weren't an official engineering manual. Most of the experts, anybody doing channel stabilization, would collect the notes from those committee meetings and use those as a source of assistance and help in doing their channel stabilization work. So it was a way to get the most out of your limited number of experts.

They would invite people from other organizations sometimes to participate. They would hire consultants to help them out, to work on doing a special job for them. They would review what the consultants had done and add their bits to it until they finally got a good document on whatever subject they were working on. So it was and still is a good tool.

Q: Now you said that was a convenient way, too, of offsetting manpower shortages or technical skill shortages at OCE.

A: Well, that's true because there were very few people in a lot of the disciplines, as I indicated before. The hydraulics people do not have much more staff now than they did then. One person for navigation, which is a big subject; another person for coastal work; and another one for the hydraulic design. Each one of those subjects is pretty tremendous by itself.

Well, hydrology is quite similar. There would be one person assigned to sediment. Another one assigned to water quality. Another one to water control management. Another one to review basic hydrology reports. So there's not too many experts in OCE. They had a lot of areas to cover. Of course, another thing, when the district offices want to have a conference and they want to get assistance on some particular project, they always want to have the best people they can get from headquarters. They don't want to take somebody who doesn't have a lot of years experience.

They always try for the person with the most experience, somebody they really know well. You can't always get them, of course. There is not enough time and energy available for one person to cover every meeting that goes on. But, one of the things that we talked a little bit about, I think, was what are the impressions of the other elements regarding hydrology and hydraulics in terms of doing Corps business. Is it a help or a hindrance and all that sort of thing.

Well, it's a basic discipline for almost everything you do in water resources. People have to know enough about it, or they can't get by at all. Planning people have to have a lot of hydrology and hydraulics. They get upset when they get delayed in their reports because the division officer and OCE reviews the material and finds that it needs some additional studies.

Revisions slow down the report process and obviously they get upset about it because that schedule is what they want to meet. They view these delays with disdain, and the people that are causing them, the same way. So there was a lot of resentment about comments. Most of the time, they're really legitimate comments, but once in a while, they will get some kind of a comment that is just a designer's choice and not really a proven difference. But the views of the guy in headquarters usually prevail of course. Something like that happens, that gets the district upset because they have to go back and redo something that they didn't want to take the time and delay their reports for.

Hydraulics and Hydrology

- Q: Now, would your section or your branch or division there, would your experts see every one of the reports that was being prepared in the Corps and all the districts and divisions?
- A: Most of them. Most of the planning **reports**-- occasionally they wouldn't, we would miss some of them. But generally, you see, most planning reports have a lot of hydrology and hydraulics background. The material may not always be in the report, it may be in an appendix which is not published or it may be in a separate document--but they really need

a. review of almost all those. I remember one **time** General Wall, when he was Director of Civil Works, we had a meeting with all the district engineers. They were all complaining about comments from OCE. General Wall got up and said, "Well, we didn't review at OCE, that was the responsibility of the division office. " But he was talking about the general planning process. I was sitting in the audience and I was looking at him and I was waving my arm. He said, "Oh, that is except for hydrology and hydraulics. " He says, "We do review hydrology and **hydraulics** at OCE. "

Some of them would have preferred that we didn't do that. There are a lot of things that are very important. If you miss something and it gets through Congress, Congress passes it, and the project's authorized, then you **find** out that the project won't work the way the planning report said it was going to work. You can get in a lot of trouble with Congressmen and everybody else.

So you have to be pretty careful that you don't plan something and present it to Congress that isn't fully operable, and not only that but meets all the economic and other tests. Things like flood frequency have a big impact on the economic viability of a project. If you make a big mistake in the frequency analysis, it will cause a big mistake in the benefit/cost ratio. So **other** elements do have problems.

If a design element in engineering decides they want to go ahead and make a complete design on something and then find out that it's a wrong size, won't pass enough flow, or is at the wrong elevation in the structure because it may not pass the right water temperature or water quality, they find that out too late. Then they've got to redo it and redesign everything. That can make a big difference, too. So they all have concerns when the hydrology and hydraulics people say, "Hey, you made a mistake. You need to redo something and it will cost time and takes extra effort. "

So by and large there's a lot complaints about your review. I mean, you don't usually get bouquets, usually they're throwing bricks at you. But it's a worthwhile type of work if you occasionally find something that really was botched up, then you can correct it. That gives you a good feeling of satisfaction and makes you realize that you're doing some good.

But one of the things that I talked about before, too, was the fact that I wanted the Hydrology and Hydraulics element to stay as a unit, not to split it up and give parts to the other major elements. I feel, and most people feel, that it's important that the Hydrology and Hydraulics people are not influenced by any more political pressure than necessary. I've seen cases myself in field offices where Hydrology and Hydraulics was under the Chief of Engineering. He would look at the results of some of those studies and decide on his own that the results weren't good.